On some equations concerning some topics of Field Theory and Gravity and applications of κ formula regarding the Zeros of Riemann Zeta Function. Mathematical connections with some sectors of String Theory and Ramanujan Mathematics.

Michele Nardelli[1], **Antonio Nardelli**[2]

Abstract

In this research thesis, we analyze some topics of Field Theory and Gravity and applications of κ formula regarding the Zeros of Riemann Zeta Function. We describe the mathematical connections with some sectors of String Theory and Ramanujan Mathematics.

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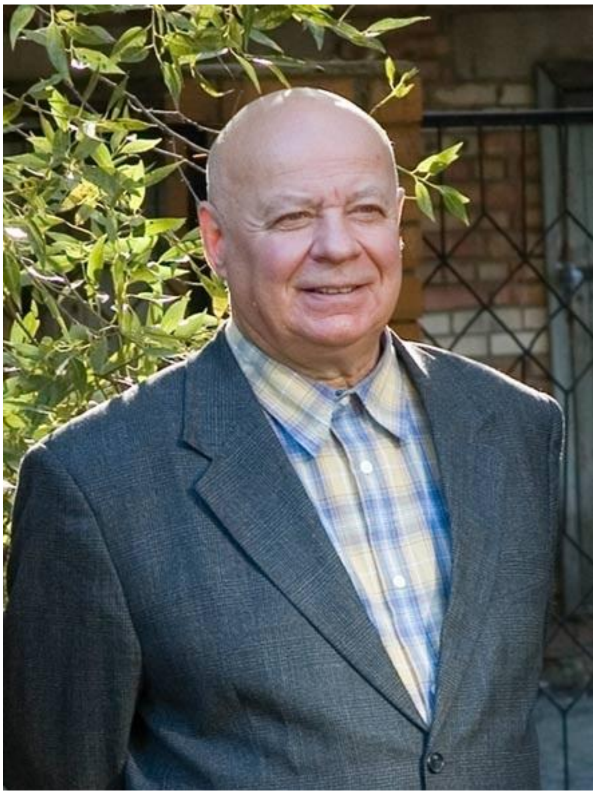
[1] M.Nardelli studied at Dipartimento di Scienze della Terra Università degli Studi di Napoli Federico II, Largo S. Marcellino, 10 - 80138 Napoli, Dipartimento di Matematica ed Applicazioni "R. Caccioppoli" - Università degli Studi di Napoli "Federico II" – Polo delle Scienze e delle Tecnologie Monte S. Angelo, Via Cintia (Fuorigrotta), 80126 Napoli, Italy

[2] A. Nardelli studies at the Università degli Studi di Napoli Federico II - Dipartimento di Studi Umanistici – **Sezione Filosofia - scholar of Theoretical Philosophy**

Anatoly A. Karatsuba

(1937-2008)

(Mathematician)



Vesuvius landscape with gorse – Naples

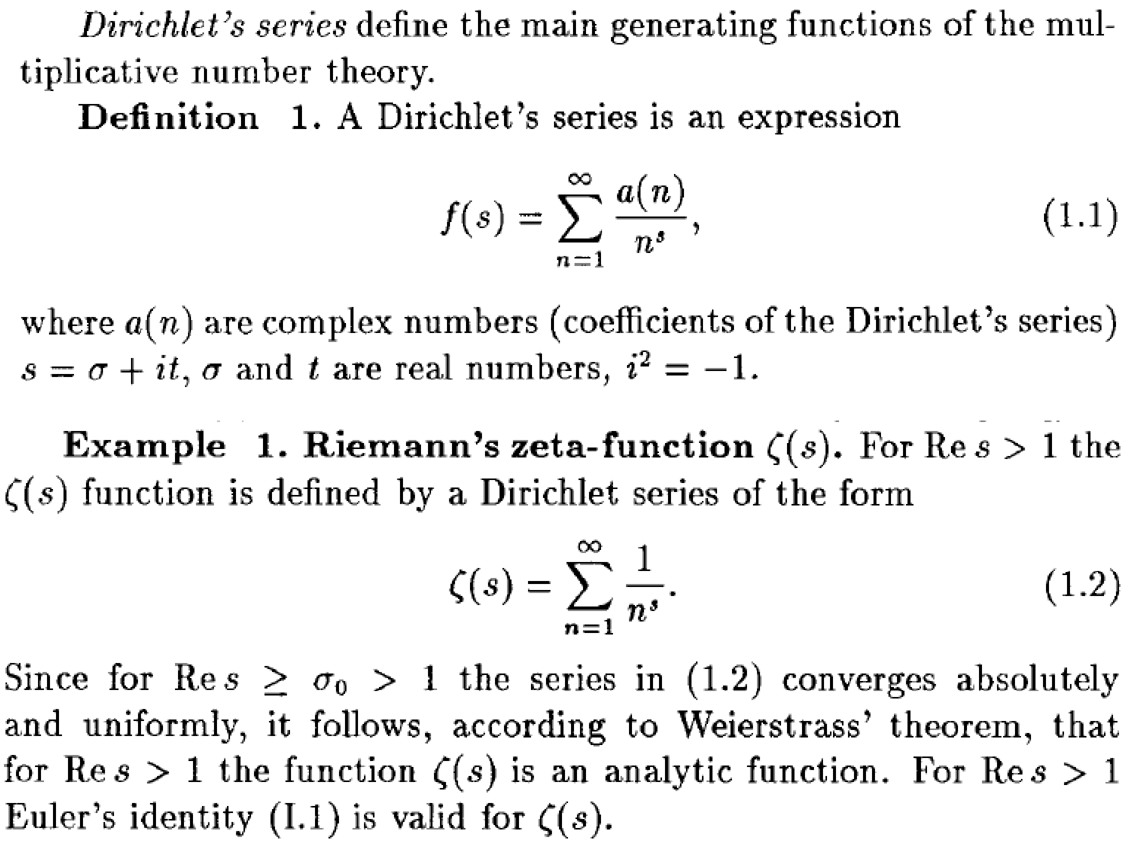
https://www.pinterest.it/pin/95068242114589901/

We want to highlight that the development of the various equations was carried out according an our possible logical and original interpretation

From:

Complex Analysis in Number Theory – 22.11.1994 - *Anatoly A. Karatsuba*

We have that:



Dirichlet's series define the main generating functions of the multiplicative number theory.

Definition 1. A Dirichlet's series is an expression

$$f(s)=\sum_{n=1}^{\infty}\frac{a(n)}{n^s}, \qquad (1.1)$$

where $a(n)$ are complex numbers (coefficients of the Dirichlet's series) $s=\sigma+it$, σ and t are real numbers, $i^2=-1$.

Example 1. Riemann's zeta-function $\zeta(s)$. For $\mathrm{Re}\,s>1$ the $\zeta(s)$ function is defined by a Dirichlet series of the form

$$\zeta(s)=\sum_{n=1}^{\infty}\frac{1}{n^s}. \qquad (1.2)$$

Since for $\mathrm{Re}\,s\geq\sigma_0>1$ the series in (1.2) converges absolutely and uniformly, it follows, according to Weierstrass' theorem, that for $\mathrm{Re}\,s>1$ the function $\zeta(s)$ is an analytic function. For $\mathrm{Re}\,s>1$ Euler's identity (I.1) is valid for $\zeta(s)$.

Example 12. For $\operatorname{Re} s > 1$ the Davenport-Heilbronn function $f(s)$ (see [42, 209, 95]) is defined by the Dirichlet series

$$f(s) = \sum_{n=1}^{\infty} \frac{r(n)}{n^s},$$

where $r(1) = 1$, $r(2) = \varkappa$, $r(3) = -\varkappa$, $r(4) = -1$, $r(5) = 0$, $r(n+5) = r(n)$, $\varkappa = \frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}$.

Theorem. *Suppose that* $G(s)$ *is an entire function of finite order,* $P(s)$ *is a polynomial,* $f(s) = G(s)P^{-1}(s)$, *and the series* $f(s) = \sum_{n=1}^{\infty} a(n)n^{-s}$ *is absolutely convergent for* $\operatorname{Re} s > 1$. *Further suppose that*

$$\pi^{-s/2}\Gamma\left(\frac{s}{2}\right) f(s) = \pi^{-(1-s)/2}\Gamma\left(\frac{1-s}{2}\right) g(1-s), \tag{3}$$

where the series $g(1-s) = \sum_{n=1}^{\infty} b(n)n^{-1+s}$ *is absolutely convergent for* $\operatorname{Re} s < -\alpha < 0$. *Then*

$$f(s) = C\zeta(s),$$

where C *is a constant.*

Note that (3) is even weaker than (2). The question naturally arises: does a functional equation of the type (2) determine the location of the zeros of the corresponding function? It turns out that this is not the case. A simple counterexample is given by the following function $f(s)$, which was introduced by Davenport and Heilbronn [3] in 1936:

$$f(s) = \frac{1-i\kappa}{2} L(s, \chi_1) + \frac{1+i\kappa}{2} L(s, \overline{\chi}_1), \tag{4}$$

where $\kappa = (\sqrt{10-2\sqrt{5}}-2)/(\sqrt{5}-1)$ and $\chi_1 = \chi_1(n)$ is the Dirichlet character modulo 5 with

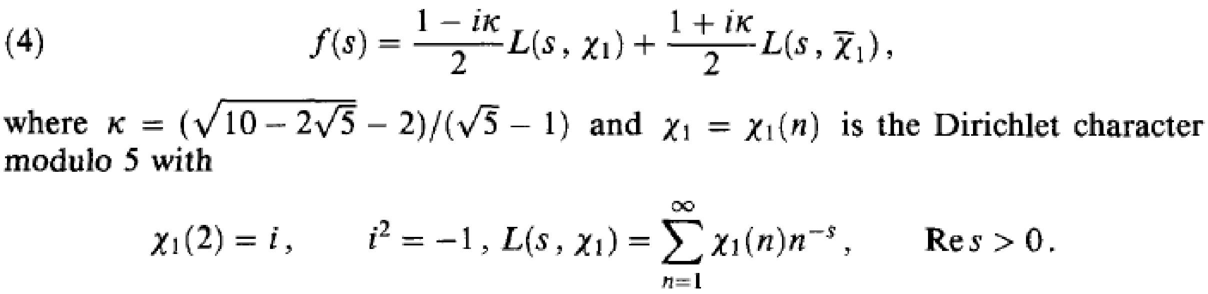
$$\chi_1(2) = i, \qquad i^2 = -1, \; L(s, \chi_1) = \sum_{n=1}^{\infty} \chi_1(n)n^{-s}, \qquad \operatorname{Re} s > 0.$$

For $\operatorname{Re} s > 0$ the function $f(s)$ has the following representation as a Dirichlet series:

$$f(s) = \sum_{n=1}^{\infty} r(n)n^{-s}, \tag{5}$$

where $r(n) = r(m)$ if $n \equiv m \pmod 5$, and $r(1) = 1$, $r(2) = \kappa$, $r(3) = -\kappa$, $r(4) = -1$, $r(5) = 0$. In addition, $f(s)$ satisfies the functional equation

$$g(s) = g(1-s), \qquad g(s) = \left(\frac{\pi}{5}\right)^{-s/2} \Gamma\left(\frac{s+1}{2}\right) f(s). \tag{6}$$



$$f(s) = \frac{1-i\kappa}{2}L(s,\chi_1) + \frac{1+i\kappa}{2}L(s,\overline{\chi}_1), \tag{4}$$

where $\kappa = (\sqrt{10-2\sqrt{5}}-2)/(\sqrt{5}-1)$ and $\chi_1 = \chi_1(n)$ is the Dirichlet character modulo 5 with

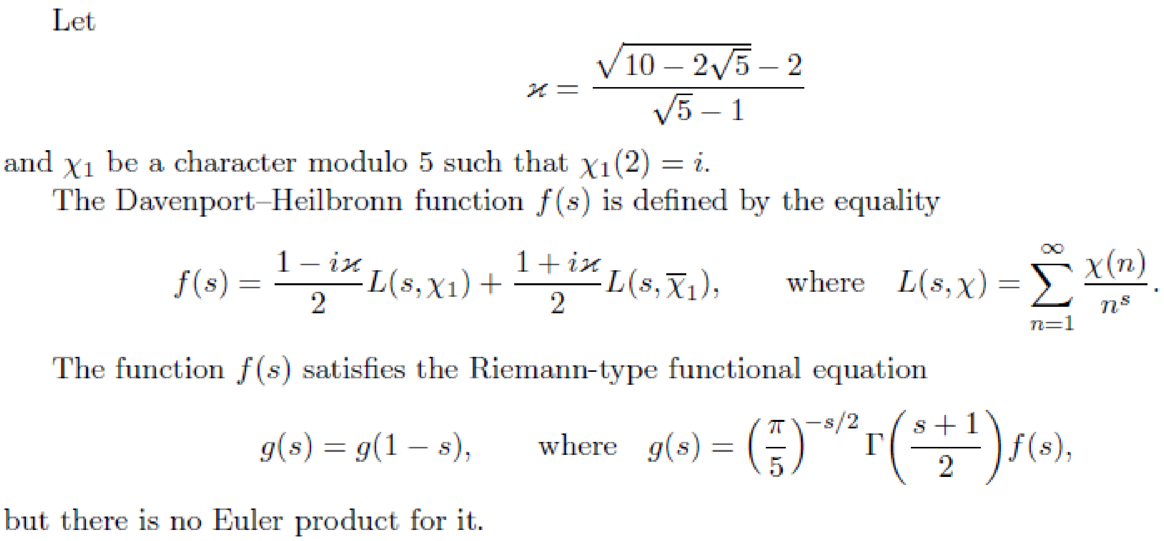
$$\chi_1(2) = i, \qquad i^2 = -1,\ L(s,\chi_1) = \sum_{n=1}^{\infty} \chi_1(n) n^{-s}, \qquad \mathrm{Re}\, s > 0.$$

From:

On the Zeros of the Davenport Heilbronn Function

S. A. Gritsenko - Received May 15, 2016 - ISSN 0081-5438, Proceedings of the Steklov Institute of Mathematics, 2017, Vol. 296, pp. 65–87.

We have:



Let

$$\varkappa = \frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}$$

and χ_1 be a character modulo 5 such that $\chi_1(2) = i$.

The Davenport–Heilbronn function $f(s)$ is defined by the equality

$$f(s) = \frac{1-i\varkappa}{2}L(s,\chi_1) + \frac{1+i\varkappa}{2}L(s,\overline{\chi}_1), \qquad \text{where} \quad L(s,\chi) = \sum_{n=1}^{\infty} \frac{\chi(n)}{n^s}.$$

The function $f(s)$ satisfies the Riemann-type functional equation

$$g(s) = g(1-s), \qquad \text{where} \quad g(s) = \left(\frac{\pi}{5}\right)^{-s/2} \Gamma\left(\frac{s+1}{2}\right) f(s),$$

but there is no Euler product for it.

$$(\sqrt{10-2\sqrt{5}}-2)/(\sqrt{5}-1) = \kappa$$

Input:

$$\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}$$

Decimal approximation:

0.2840790438404122960282918323931261690910880884457375827591626661

…

0.28407904384…. = κ

Alternate forms:

$$\frac{1}{4}\left(\sqrt{10-2\sqrt{5}}-2\sqrt{5}+\sqrt{5\left(10-2\sqrt{5}\right)}-2\right)$$

$$\frac{1}{4}\left(1+\sqrt{5}\right)\left(\sqrt{10-2\sqrt{5}}-2\right)$$

$$\frac{1}{2}\left(-1-\sqrt{5}+\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

Minimal polynomial:

$$x^4+2x^3-6x^2-2x+1$$

Expanded forms:

$$\frac{\sqrt{10-2\sqrt{5}}}{\sqrt{5}-1}-\frac{2}{\sqrt{5}-1}$$

$$\frac{1}{4}\sqrt{10-2\sqrt{5}}+\frac{1}{4}\sqrt{5\left(10-2\sqrt{5}\right)}+\frac{1}{2}\left(-1-\sqrt{5}\right)$$

For ((((√(10-2√5) -2))⁄((√5-1)))) = 8πG; G = 0.011303146014

Indeed:

((((√(10-2√5) -2))⁄((√5-1))))/(8π)

Input:

$$\frac{\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}}{8\pi}$$

Result:

$$\frac{\sqrt{10-2\sqrt{5}}-2}{8\left(\sqrt{5}-1\right)\pi}$$

Decimal approximation:

0.0113031460140052147973750129442035744685760313920017808594909667
…

0.01130314…. = g (gravitational coupling constant)

Property:

$$\frac{-2+\sqrt{10-2\sqrt{5}}}{8\left(-1+\sqrt{5}\right)\pi}$$ is a transcendental number

Alternate forms:

$$\frac{\sqrt{10-2\sqrt{5}}-2\sqrt{5}+\sqrt{5\left(10-2\sqrt{5}\right)}-2}{32\pi}$$

$$-\frac{1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}}{16\pi}$$

$$\frac{-1-\sqrt{5}+\sqrt{2\left(5+\sqrt{5}\right)}}{16\pi}$$

Expanded forms:

$$-\frac{1}{16\pi}-\frac{\sqrt{5}}{16\pi}+\frac{\sqrt{10-2\sqrt{5}}}{32\pi}+\frac{\sqrt{5\left(10-2\sqrt{5}\right)}}{32\pi}$$

$$\frac{\sqrt{10-2\sqrt{5}}}{8\left(\sqrt{5}-1\right)\pi}-\frac{1}{4\left(\sqrt{5}-1\right)\pi}$$

Series representations:

$$\frac{\sqrt{10-2\sqrt{5}}-2}{(8\pi)\left(\sqrt{5}-1\right)}=\frac{-2+\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}}{8\pi\left(-1+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)}$$

$$\frac{\sqrt{10-2\sqrt{5}}-2}{(8\pi)\left(\sqrt{5}-1\right)} = \frac{-2+\sqrt{9-2\sqrt{5}}\,\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}}{8\pi\left(-1+\sqrt{4}\,\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)}$$

$$\frac{\sqrt{10-2\sqrt{5}}-2}{(8\pi)\left(\sqrt{5}-1\right)} = \frac{-2+\sqrt{z_0}\,\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}-z_0\right)^k z_0^{-k}}{k!}}{8\pi\left(-1+\sqrt{z_0}\,\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(5-z_0\right)^k z_0^{-k}}{k!}\right)}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

We note that:

(((√(10-2√5) -2))/((√5-1)))*((2 i (sqrt(5) - 1) t + sqrt(5) - 1)/(2 (sqrt(2 (5 - sqrt(5))) - 2)))

Input:

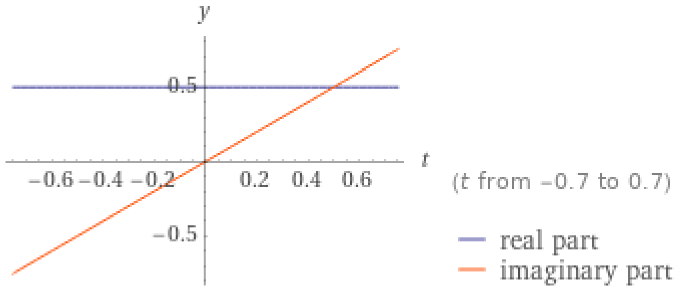
$$\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\times\frac{2\,i\left(\sqrt{5}-1\right)t+\sqrt{5}-1}{2\left(\sqrt{2\left(5-\sqrt{5}\right)}-2\right)}$$

i is the imaginary unit

Exact result:

$$\frac{\left(\sqrt{10-2\sqrt{5}}-2\right)\left(2\,i\left(\sqrt{5}-1\right)t+\sqrt{5}-1\right)}{2\left(\sqrt{5}-1\right)\left(\sqrt{2\left(5-\sqrt{5}\right)}-2\right)}$$

Plot:



Alternate form assuming t>0:

$$\frac{i\sqrt{10-2\sqrt{5}}\,t}{\sqrt{2(5-\sqrt{5})}-2} - \frac{2\,i\,t}{\sqrt{2(5-\sqrt{5})}-2} +$$

$$\frac{\sqrt{5(10-2\sqrt{5})}}{2(\sqrt{5}-1)\left(\sqrt{2(5-\sqrt{5})}-2\right)} - \frac{\sqrt{10-2\sqrt{5}}}{2(\sqrt{5}-1)\left(\sqrt{2(5-\sqrt{5})}-2\right)} -$$

$$\frac{\sqrt{5}}{(\sqrt{5}-1)\left(\sqrt{2(5-\sqrt{5})}-2\right)} + \frac{1}{(\sqrt{5}-1)\left(\sqrt{2(5-\sqrt{5})}-2\right)}$$

Alternate forms:

$$\frac{1}{8}(1+\sqrt{5})\left(2\,i\sqrt{2(3-\sqrt{5})}\,t+\sqrt{5}-1\right)$$

$$\frac{1}{2}(1+2\,i\,t)$$

$$\frac{1}{2}+i\,t$$

1/2+it = real part of every nontrivial zero of the Riemann zeta function

Derivative:

$$\frac{d}{dt}\left(\frac{\left(\sqrt{10-2\sqrt{5}}-2\right)\left(2i\left(\sqrt{5}-1\right)t+\sqrt{5}-1\right)}{\left(\sqrt{5}-1\right)\left(2\left(\sqrt{2\left(5-\sqrt{5}\right)}-2\right)\right)}\right)=i$$

Indefinite integral:

$$\int\frac{\left(\sqrt{10-2\sqrt{5}}-2\right)\left(2i\left(\sqrt{5}-1\right)t+\sqrt{5}-1\right)}{\left(\sqrt{5}-1\right)\left(2\left(\sqrt{2\left(5-\sqrt{5}\right)}-2\right)\right)}\,dt=\frac{t}{2}+\frac{i\,t^2}{2}+\text{constant}$$

And again:

(((√(10-2√5) -2))/((2x)))*((2 i (sqrt(5) - 1) t + sqrt(5) - 1)/(2 (sqrt(2 (5 - sqrt(5))) - 2))) = (1/2+it)

Input:

$$\frac{\sqrt{10-2\sqrt{5}}-2}{2x}\times\frac{2i\left(\sqrt{5}-1\right)t+\sqrt{5}-1}{2\left(\sqrt{2\left(5-\sqrt{5}\right)}-2\right)}=\frac{1}{2}+i\,t$$

i is the imaginary unit

Exact result:

$$\frac{\left(\sqrt{10-2\sqrt{5}}-2\right)\left(2i\left(\sqrt{5}-1\right)t+\sqrt{5}-1\right)}{4\left(\sqrt{2\left(5-\sqrt{5}\right)}-2\right)x}=\frac{1}{2}+i\,t$$

Alternate form assuming t and x are real:

$$\frac{\sqrt{5}-1}{x} = 2$$

Alternate form:

$$\frac{\left(\sqrt{5}-1\right)(1+2\,i\,t)}{4\,x} = \frac{1}{2} + i\,t$$

Alternate form assuming t and x are positive:

$$2\,x + 1 = \sqrt{5}$$

Expanded forms:

$$\frac{i\sqrt{5\left(10-2\sqrt{5}\right)}\,t}{2\left(\sqrt{2\left(5-\sqrt{5}\right)}-2\right)x} - \frac{i\sqrt{10-2\sqrt{5}}\,t}{2\left(\sqrt{2\left(5-\sqrt{5}\right)}-2\right)x} - \frac{i\sqrt{5}\,t}{\left(\sqrt{2\left(5-\sqrt{5}\right)}-2\right)x} + \frac{i\,t}{\left(\sqrt{2\left(5-\sqrt{5}\right)}-2\right)x} + \frac{\sqrt{5\left(10-2\sqrt{5}\right)}}{4\left(\sqrt{2\left(5-\sqrt{5}\right)}-2\right)x} - \frac{\sqrt{10-2\sqrt{5}}}{4\left(\sqrt{2\left(5-\sqrt{5}\right)}-2\right)x} - \frac{\sqrt{5}}{2\left(\sqrt{2\left(5-\sqrt{5}\right)}-2\right)x} + \frac{1}{2\left(\sqrt{2\left(5-\sqrt{5}\right)}-2\right)x} = \frac{1}{2} + i\,t$$

$$\frac{i\sqrt{5}\,t}{2\,x} - \frac{i\,t}{2\,x} + \frac{\sqrt{5}}{4\,x} - \frac{1}{4\,x} = \frac{1}{2} + i\,t$$

Solutions:

$$t = \frac{i}{2}\,,\quad x \neq 0$$

$$x = \frac{\sqrt{5}}{2} - \frac{1}{2}$$

Input:

$$\frac{\sqrt{5}}{2} - \frac{1}{2}$$

Decimal approximation:

0.6180339887498948482045868343656381177203091798057628621354486227
…

$0.6180339887…. = \frac{1}{\phi}$

Solution for the variable x:

$$x = \frac{-2 i \sqrt{5}\, t + 2 i t - \sqrt{5} + 1}{-2 - 4 i t}$$

Implicit derivatives:

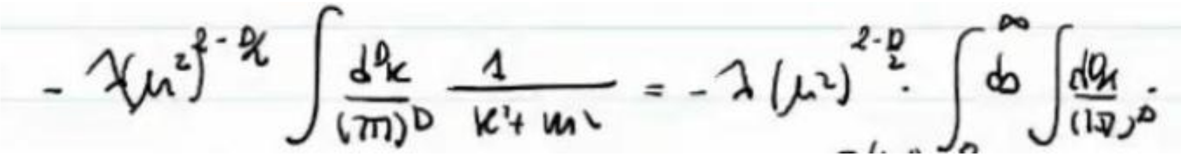
$$\frac{\partial x(t)}{\partial t} = \frac{2\left(-1 + \sqrt{5} - 2 x\right) x}{\left(-1 + \sqrt{5}\right)(-i + 2 t)}$$

$$\frac{\partial t(x)}{\partial x} = \frac{\left(-1 + \sqrt{5}\right)(-i + 2 t)}{2\left(-1 + \sqrt{5} - 2 x\right) x}$$

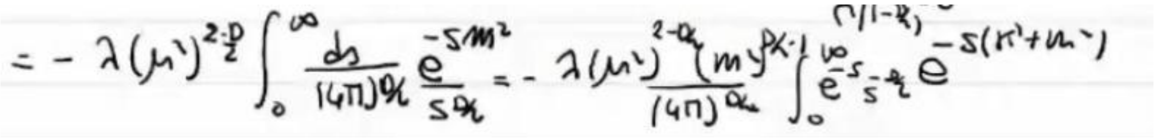
From:

Course of Field Theory and Gravity - *Prof. Augusto Sagnotti* (SNS Pisa-Italy)

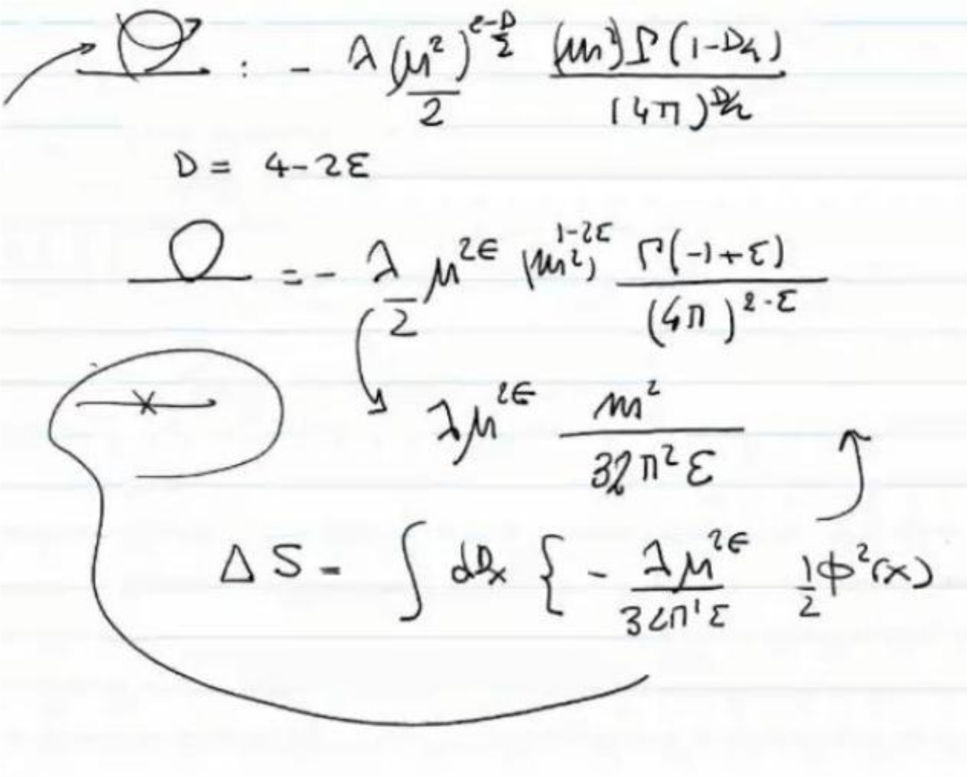
We have that:



$$-\lambda(\mu^2)^{2-\frac{D}{2}}\int\frac{d^Dk}{(2\pi)^D}\frac{1}{k^2+m^2} = -\lambda(\mu^2)^{2-\frac{D}{2}}\int_0^\infty ds\int\frac{d^Dk}{(2\pi)^D}$$



$$= -\lambda(\mu^2)^{2-\frac{D}{2}}\int_0^\infty\frac{ds}{(4\pi)^{D/2}}\frac{e^{-sm^2}}{s^{D/2}} = -\lambda\frac{(\mu^2)^{2-\frac{D}{2}}(m^2)^{\frac{D}{2}-1}}{(4\pi)^{D/2}}\int_0^\infty e^{-s}s^{-\frac{D}{2}}\quad e^{-s(k^2+m^2)}$$



$$: -\frac{\lambda}{2}(\mu^2)^{2-\frac{D}{2}}\frac{(m^2)\Gamma(1-D/2)}{(4\pi)^{D/2}}$$

$D = 4-2\varepsilon$

$$= -\frac{\lambda}{2}\mu^{2\epsilon}(m^2)^{1-2\varepsilon}\frac{\Gamma(-1+\varepsilon)}{(4\pi)^{2-\varepsilon}}$$

$$\lambda\mu^{2\epsilon}\frac{m^2}{32\pi^2\varepsilon}$$

$$\Delta S = \int d^Dx\left\{-\frac{\lambda\mu^{2\epsilon}}{32\pi^2\varepsilon}\frac{1}{2}\phi^2(x)\right.$$

$$-\lambda(\mu^2)^{2-D/2}\int_0^\infty \frac{ds}{(4\pi)^{D/2}}\frac{e^{-sm^2}}{s^{-D/2}}$$

$$= -\lambda(\mu^2)^{2-D/2}\frac{(m^2)^{\frac{D}{2}-1}}{(4\pi)^{D/2}}\int_0^\infty e^{-s}s^{-D/2} \;= \Gamma(1-D/2)$$

$$= -\frac{\lambda}{2}(\mu^2)^{2-D/2}\frac{(m^2)^{\frac{D}{2}-1}\Gamma(1-D/2)}{(4\pi)^{D/2}}$$

$$= -\frac{\lambda}{2}\mu^{2\varepsilon}(m^2)^{1-2\varepsilon}\frac{\Gamma(-1+\varepsilon)}{(4\pi)^{2-\varepsilon}}$$

$$\lambda\mu^{2\varepsilon}\ \frac{m^2}{32\pi^2\varepsilon}$$

From:

$$-\lambda(\mu^2)^{2-D/2}\frac{(m^2)^{\frac{D}{2}-1}}{(4\pi)^{D/2}}\int_0^\infty e^{-s}s^{-D/2} \;= \Gamma(1-D/2)$$

For D = 10:

λ(μ^2)^(2-10/2) (0.511^2)^(10/2-1)/(4π)^(10/2) integrate((e^(-s) s^(-10/2))) = gamma(-1+10/2)

Input:

$$\lambda(\mu^2)^{2-10/2}\times\frac{(0.511^2)^{10/2-1}}{(4\pi)^{10/2}}\int e^{-s}\,s^{-10/2}\,ds = \Gamma\left(-1+\frac{10}{2}\right)$$

$\lambda(n)$ gives the Liouville function

$\Gamma(x)$ is the gamma function

Result:

$$\frac{6.18168\times 10^{-10}\,e^{-s}\left(e^s\,s^4\,\mathrm{Ei}(-s)+s^3-s^2+2\,s-6\right)}{s^4\,\lambda(\mu^2)^3} = 6$$

(6.18168×10^-10 e^(-1/2) (e^(1/2) (1/2)^4 Ei(-1/2) + (1/2)^3 - (1/2)^2 + 2 (1/2) - 6))/((1/2)^4 λ(μ^2)^3) = 6

Input interpretation:

$$\frac{6.18168\times 10^{-10}\, e^{-1/2}\left(\sqrt{e}\,\left(\frac{1}{2}\right)^4 \mathrm{Ei}\left(-\frac{1}{2}\right)+\left(\frac{1}{2}\right)^3-\left(\frac{1}{2}\right)^2+2\times\frac{1}{2}-6\right)}{\left(\frac{1}{2}\right)^4 \lambda\left(\mu^2\right)^3}=6$$

$\mathrm{Ei}(x)$ is the exponential integral Ei

$\lambda(n)$ gives the Liouville function

Result:

$$-\frac{3.10909\times 10^{-8}}{\lambda\left(\mu^2\right)^3}=6$$

-(3.10909×10^-8)/x(y^2)^3 = 6

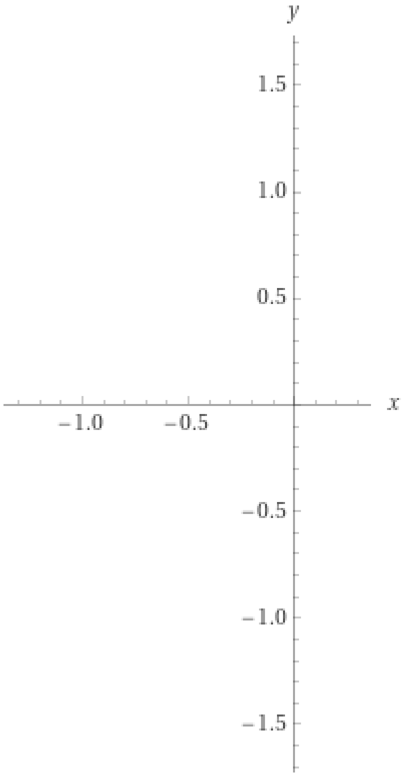
Input interpretation:

$$-\frac{3.10909\times 10^{-8}}{x}\left(y^2\right)^3=6$$

Result:

$$-\frac{3.10909\times 10^{-8}\, y^6}{x}=6$$

Implicit plot:



Alternate form:

$x = -5.18182\times 10^{-9}\, y^6$

Alternate form assuming x and y are real:

$$0 - \frac{3.10909\times 10^{-8}\, y^6}{x} = 6$$

Solutions:

$y \approx (-20.8185 - 12.0196\, i)\sqrt[6]{x}\ , \quad x \neq 0$

$y \approx (-20.8185 + 12.0196\, i)\sqrt[6]{x}\ , \quad x \neq 0$

$y \approx (-24.0392\, i)\sqrt[6]{x}\ , \quad x \neq 0$

$y \approx (24.0392\, i)\sqrt[6]{x}\,, \quad x \neq 0$

$y \approx (20.8185 - 12.0196\, i)\sqrt[6]{x}\,, \quad x \neq 0$

Integer solutions:

$x = -29\,960\,775\,249\,812\,356\,928\,402\,675\,194\,704\,113\,154\,534\,644\,383\,422\,182\,000\,871$
$341\,103\,125\, n^6$

$x = -29\,960\,775\,249\,812\,356\,928\,402\,675\,194\,704\,113\,154\,534\,644\,383\,422\,182\,000\,871$
$341\,103\,125\, n^6$

$\mathbb{Z}$ is the set of integers

Solutions for the variable y:

$y \approx (-20.8185 + 12.0196\, i)\sqrt[6]{x}$

$y \approx (-20.8185 - 12.0196\, i)\sqrt[6]{x}$

$y \approx (20.8185 + 12.0196\, i)\sqrt[6]{x}$

Implicit derivatives:

$$\frac{\partial x(y)}{\partial y} = -\frac{116\,612\, y^5}{3\,750\,679\,459\,263}$$

$$\frac{\partial y(x)}{\partial x} = -\frac{3\,750\,679\,459\,263}{116\,612\, y^5}$$

from

$$-\frac{3.10909\times 10^{-8}}{\lambda(\mu^2)^3} = 6$$

And

$$x = -5.18182\times 10^{-9}\, y^6$$

-(3.10909×10^-8)/(((-5.18182×10^-9 y^6)(y^2)^3)) = 6

Input interpretation:

$$-\frac{3.10909\times 10^{-8}}{\left(-5.18182\times 10^{-9}\, y^6\right)\left(y^2\right)^3} = 6$$

Result:

$$\frac{6.}{y^{12}} = 6$$

Alternate form assuming y is positive:

$y = 1.$ (for $y \neq 0$)

Alternate form assuming y is real:

$$\frac{6.}{y^{12}} + 0 = 6$$

Real solutions:

$y \approx -1.$

$y \approx 1.$

Complex solutions:

$y = -0.866025 - 0.5\,i$

$y = -0.866025 + 0.5\,i$

$y = -0.5 - 0.866025\,i$

$y = -0.5 + 0.866025\,i$

$y = -1.\,i$

-(3.10909×10^-8)/(((-5.18182×10^-9)))

Input interpretation:

$$\frac{-3.10909\times 10^{-8}}{-5.18182\times 10^{-9}}$$

Result:

5.9999961403522314553573840851283911830206375366184082040672968184

…

Repeating decimal:

5.9999961403522314553573840851283911830206375366184082040672968184

…

(period 55518)

5.99999614035…. ≈ 6

With D = 11:

λ(μ^2)^(2-11/2) (0.511^2)^(11/2-1)/(4π)^(11/2) integrate((e^(-s) s^(-11/2))) = gamma(-1+11/2)

Input:

$$\lambda\left(\mu^2\right)^{2-11/2} \times \frac{\left(0.511^2\right)^{11/2-1}}{(4\,\pi)^{11/2}} \int e^{-s}\, s^{-11/2}\, ds = \Gamma\left(-1+\frac{11}{2}\right)$$

λ(n) gives the Liouville function

Γ(x) is the gamma function

Result:

$$\frac{4.52618\times 10^{-12}\, e^{-s}\left(16\, e^s\, s^{9/2}\, \Gamma\left(\frac{1}{2}, s\right) - 16\, s^4 + 8\, s^3 - 12\, s^2 + 30\, s - 105\right)}{s^{9/2}\, \lambda\left(\mu^2\right)^{7/2}} =$$

$$\frac{105\sqrt{\pi}}{16}$$

where

$$\frac{105\sqrt{\pi}}{16}$$

is equal to

(105 sqrt(π))/16

Input:

$$\frac{1}{16}\left(105\sqrt{\pi}\right)$$

Exact result:

$$\frac{105\sqrt{\pi}}{16}$$

Decimal approximation:

11.631728396567448929144224109426265262108918305803165528903113620

…

11.631728…

Property:

$\frac{105\sqrt{\pi}}{16}$ is a transcendental number

Series representations:

$$\frac{105\sqrt{\pi}}{16} = \frac{105}{16}\sqrt{-1+\pi}\sum_{k=0}^{\infty}(-1+\pi)^{-k}\binom{\frac{1}{2}}{k}$$

$$\frac{105\sqrt{\pi}}{16} = \frac{105}{16}\sqrt{-1+\pi}\sum_{k=0}^{\infty}\frac{(-1)^k(-1+\pi)^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

$$\frac{105\sqrt{\pi}}{16} = \frac{105}{16}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\pi-z_0)^k z_0^{-k}}{k!}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

For s =1/2 , we obtain:

(4.52618×10^-12 e^(-1/2) (16 e^(1/2)*(1/2)^(9/2) Γ(1/2, 1/2) - 16 (1/2)^4 + 8 (1/2)^3 - 12 (1/2)^2 + 30 *1/2 - 105))/((1/2)^(9/2) λ(μ^2)^(7/2)) = (105 sqrt(π))/16

Input interpretation:

$$\frac{1}{\left(\frac{1}{2}\right)^{9/2}\lambda\left(\mu^{2}\right)^{7/2}}\, 4.52618\times 10^{-12}\, e^{-1/2}\left(16\left(\sqrt{e}\left(\frac{1}{2}\right)^{9/2}\right)\Gamma\left(\frac{1}{2},\frac{1}{2}\right)- 16\left(\frac{1}{2}\right)^{4}+8\left(\frac{1}{2}\right)^{3}-12\left(\frac{1}{2}\right)^{2}+30\times\frac{1}{2}-105\right)=\frac{1}{16}\left(105\sqrt{\pi}\right)$$

$\Gamma(a, x)$ is the incomplete gamma function

$\lambda(n)$ gives the Liouville function

Result:

$$-\frac{5.73627\times 10^{-9}}{\lambda\left(\mu^{2}\right)^{7/2}}=\frac{105\sqrt{\pi}}{16}$$

-(5.73627×10^-9)/((x(y^2)^(7/2))) = (105 sqrt(π))/16

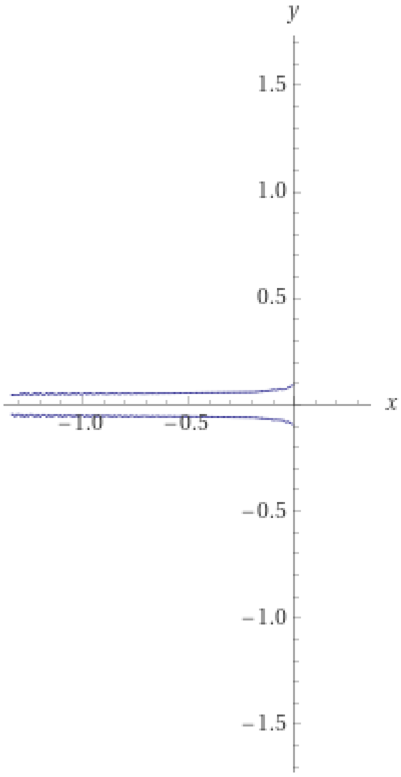
Input interpretation:

$$-\frac{5.73627\times 10^{-9}}{x\left(y^{2}\right)^{7/2}}=\frac{1}{16}\left(105\sqrt{\pi}\right)$$

Result:

$$-\frac{5.73627\times 10^{-9}}{x\left(y^{2}\right)^{7/2}}=\frac{105\sqrt{\pi}}{16}$$

Implicit plot:



Alternate form assuming x and y are real:

$$\frac{4.93157\times 10^{-10}}{x\,|y|^{7}} + 1 = 0$$

$|z|$ is the absolute value of z

Alternate form:

$$x\left(y^{2}\right)^{7/2} = -4.93157\times 10^{-10}$$

Alternate form assuming x and y are positive:

$$-\frac{5.73627\times 10^{-9}}{x\,y^{7}} = \frac{105\sqrt{\pi}}{16}$$

Expanded forms:

$$-\frac{5.73627\times 10^{-9}\sqrt{y^2}}{x\,y^8} = \frac{105\sqrt{\pi}}{16}$$

$$-\frac{5.73627\times 10^{-9}}{(y^2)^{7/2}} = \frac{105\sqrt{\pi}\;x}{16}$$

Real solutions:

$$x < 0\,,\quad y \approx \frac{0.0291915 + 0.0366049\,i}{\sqrt[7]{x}}$$

$$x < 0\,,\quad y \approx -\frac{0.0291915 + 0.0366049\,i}{\sqrt[7]{x}}$$

Solutions for the variable y:

$$y \approx -\frac{0.0421829 + 0.0203142\,i}{\sqrt[7]{x}}$$

$$y \approx -\frac{0.0421829 - 0.0203142\,i}{\sqrt[7]{x}}$$

$$y \approx -\frac{0.0291915 + 0.0366049\,i}{\sqrt[7]{x}}$$

$$y \approx -\frac{0.0291915 - 0.0366049\, i}{\sqrt[7]{x}}$$

$$y \approx -\frac{0.0104183 + 0.0456456\, i}{\sqrt[7]{x}}$$

$$y \approx -\frac{0.0104183 - 0.0456456\, i}{\sqrt[7]{x}}$$

$$y \approx \frac{0.0104183 - 0.0456456\, i}{\sqrt[7]{x}}$$

$$y \approx \frac{0.0104183 + 0.0456456\, i}{\sqrt[7]{x}}$$

$$y \approx \frac{0.0291915 - 0.0366049\, i}{\sqrt[7]{x}}$$

$$y \approx \frac{0.0291915 + 0.0366049\, i}{\sqrt[7]{x}}$$

$$y \approx \frac{0.0421829 - 0.0203142\, i}{\sqrt[7]{x}}$$

$$y \approx \frac{0.0421829 + 0.0203142\, i}{\sqrt[7]{x}}$$

Implicit derivatives:

$$\frac{\partial y(x)}{\partial x} = \frac{6\,973\,165\,779\,327\,749\,755\,476\,965\,025\,\pi\,x\,y^{15}}{5\,327\,832\,064 - 55\,785\,326\,234\,621\,998\,043\,815\,720\,200\,\pi\,x^2\,y^{14}}$$

$$\frac{\partial x(y)}{\partial y} = \frac{5\,327\,832\,064}{6\,973\,165\,779\,327\,749\,755\,476\,965\,025\,\pi\,x\,y^{15}} - \frac{8\,x}{y}$$

From:

$$-\frac{5.73627\times 10^{-9}}{\left(y^2\right)^{7/2}} = \frac{105\,\sqrt{\pi}\,x}{16}$$

For x = -1 and

$$x < 0\,,\quad y \approx \frac{0.0291915 + 0.0366049\,i}{\sqrt[7]{x}}$$

-(5.73627×10^-9)/((-(((0.0291915 + 0.0366049 i)/(-1)^(1/7))^2)^(7/2)))

Input interpretation:

$$\frac{-5.73627\times 10^{-9}}{-\left(\left(\frac{0.0291915+0.0366049\,i}{\sqrt[7]{-1}}\right)^2\right)^{7/2}}$$

i is the imaginary unit

Result:

$-11.6317\ldots - 0.0000902095\ldots\,i$

Polar coordinates:

$r = 11.6317$ (radius), $\theta = -3.14158$ (angle)

11.6317

Polar forms:

$$11.6317\,(\cos(-3.14158) + i\sin(-3.14158))$$

$$11.6317\,e^{-3.14158\,i}$$

For D = 7 :

λ(μ^2)^(2-7/2) (0.511^2)^(7/2-1)/(4π)^(7/2) integrate((e^(-7) s^(-7/2))) = gamma(-1+7/2)

Input:

$$\lambda\left(\mu^2\right)^{2-7/2} \times \frac{\left(0.511^2\right)^{7/2-1}}{(4\,\pi)^{7/2}} \int \frac{s^{-7/2}}{e^7}\,ds = \Gamma\left(-1+\frac{7}{2}\right)$$

$\lambda(n)$ gives the Liouville function

$\Gamma(x)$ is the gamma function

Result:

$$-\frac{1.80663\times 10^{-9}}{s^{5/2}\,\lambda\left(\mu^2\right)^{3/2}} = \frac{3\sqrt{\pi}}{4}$$

-(1.80663×10^-9)/(0.5^(5/2) λ(μ^2)^(3/2)) = (3 sqrt(π))/4

Input interpretation:

$$-\frac{1.80663\times 10^{-9}}{0.5^{5/2}\,\lambda\left(\mu^2\right)^{3/2}} = \frac{1}{4}\left(3\sqrt{\pi}\right)$$

$\lambda(n)$ gives the Liouville function

Result:

$$-\frac{1.02198\times 10^{-8}}{\lambda\left(\mu^2\right)^{3/2}} = \frac{3\sqrt{\pi}}{4}$$

From which:

-(1.02198×10^-8)/((x(y^2)^(3/2))) = (3 sqrt(π))/4

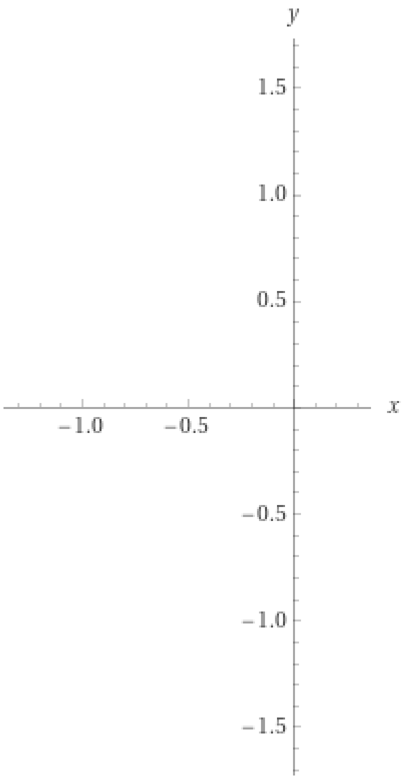
Input interpretation:

$$-\frac{1.02198\times 10^{-8}}{x\left(y^2\right)^{3/2}} = \frac{1}{4}\left(3\sqrt{\pi}\right)$$

Result:

$$-\frac{1.02198\times 10^{-8}}{x\left(y^2\right)^{3/2}} = \frac{3\sqrt{\pi}}{4}$$

Implicit plot:



Alternate form assuming x and y are real:

$$\frac{7.68787\times 10^{-9}}{x\,|y|^3}+1=0$$

$|z|$ is the absolute value of z

Alternate form:

$$x\left(y^2\right)^{3/2}=-7.68787\times 10^{-9}$$

Alternate form assuming x and y are positive:

$$-\frac{1.02198\times 10^{-8}}{x\,y^3}=\frac{3\sqrt{\pi}}{4}$$

Expanded forms:

$$-\frac{1.02198\times 10^{-8}\sqrt{y^2}}{x\,y^4}=\frac{3\sqrt{\pi}}{4}$$

$$-\frac{1.02198\times 10^{-8}}{\left(y^2\right)^{3/2}}=\frac{3\sqrt{\pi}\,x}{4}$$

Real solutions:

$$x<0\,,\quad y\approx-\frac{0.000986822-0.00170923\,i}{\sqrt[3]{x}}$$

$$x<0\,,\quad y\approx\frac{0.000986822-0.00170923\,i}{\sqrt[3]{x}}$$

Solutions for the variable y:

$$y\approx-\frac{0.000986822+0.00170923\,i}{\sqrt[3]{x}}$$

$$y \approx -\frac{0.000986822 - 0.00170923\, i}{\sqrt[3]{x}}$$

$$y \approx \frac{0.000986822 - 0.00170923\, i}{\sqrt[3]{x}}$$

$$y \approx \frac{0.000986822 + 0.00170923\, i}{\sqrt[3]{x}}$$

Implicit derivatives:

$$\frac{\partial y(x)}{\partial x} = \frac{107\,995\,562\,704\,076\,919\,589\,809\,\pi\, x\, y^7}{20\,052\,484 - 431\,982\,250\,816\,307\,678\,359\,236\,\pi\, x^2\, y^6}$$

$$\frac{\partial x(y)}{\partial y} = \frac{20\,052\,484}{107\,995\,562\,704\,076\,919\,589\,809\,\pi\, x\, y^7} - \frac{4\, x}{y}$$

From

$$\frac{3\sqrt{\pi}}{4}$$

We obtain:

Input:

$$\frac{1}{4}\left(3\sqrt{\pi}\right)$$

Exact result:

$$\frac{3\sqrt{\pi}}{4}$$

Decimal approximation:

1.3293403881791370204736256125058588870981620920917903461603558423
…

1.32934038…..

Property:

$\frac{3\sqrt{\pi}}{4}$ is a transcendental number

Series representations:

$$\frac{3\sqrt{\pi}}{4}=\frac{3}{4}\sqrt{-1+\pi}\sum_{k=0}^{\infty}(-1+\pi)^{-k}\binom{\frac{1}{2}}{k}$$

$$\frac{3\sqrt{\pi}}{4}=\frac{3}{4}\sqrt{-1+\pi}\sum_{k=0}^{\infty}\frac{(-1)^k(-1+\pi)^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

$$\frac{3\sqrt{\pi}}{4}=\frac{3}{4}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(\pi-z_0)^k z_0^{-k}}{k!} \quad \text{for (not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$$

From

$$-\frac{1.02198\times 10^{-8}}{x\left(y^2\right)^{3/2}}=\frac{1}{4}\left(3\sqrt{\pi}\right)$$

$$x < 0, \quad y \approx \frac{0.000986822 - 0.00170923\, i}{\sqrt[3]{x}}$$

-(1.02198×10^-8)/((x(((0.000986822 - 0.00170923 i)/x^(1/3))^2)^(3/2)))

x = 0.5 :

Input interpretation:

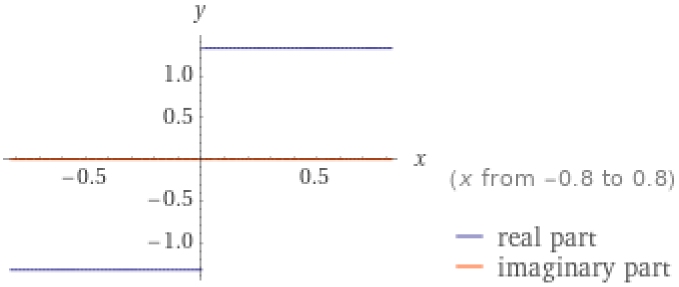
$$-\frac{1.02198 \times 10^{-8}}{x\left(\left(\frac{0.000986822+i\times(-0.00170923)}{\sqrt[3]{x}}\right)^2\right)^{3/2}}$$

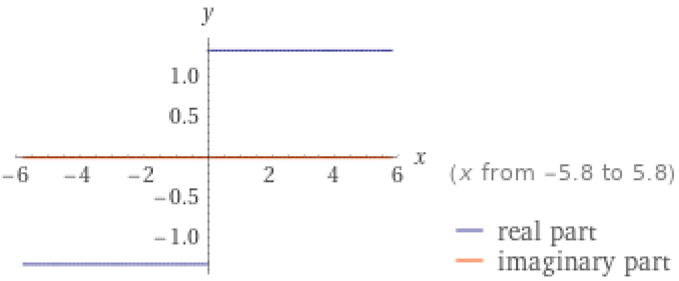
i is the imaginary unit

Result:

$$-\frac{1.02198 \times 10^{-8}}{\left(-\frac{1.94765\times 10^{-6}+3.37341\times 10^{-6}\, i}{x^{2/3}}\right)^{3/2} x}$$

Plots:





Alternate form:

$$(-1.72912\times 10^{8} - 1092.84\, i)\left(-\frac{1.94765\times 10^{-6} + 3.37341\times 10^{-6}\, i}{x^{2/3}}\right)^{3/2} x$$

Alternate form assuming x>0:

$$1.32933 + 4.20085\times 10^{-6}\, i$$

Alternate form assuming x is positive:

$$1.32933 + 4.20085\times 10^{-6}\, i$$

Expanded form:

$$(336.768 + 583.305\, i)\sqrt{-\frac{1.94765\times 10^{-6} + 3.37341\times 10^{-6}\, i}{x^{2/3}}}\ \sqrt[3]{x}$$

Roots:

(no roots exist)

Series expansion at x = 0:

$$-\frac{1.02198\times 10^{-8}}{\left(-\frac{1.94765\times 10^{-6}+3.37341\times 10^{-6}\, i}{x^{2/3}}\right)^{3/2} x} + O\left(x^{16/3}\right)$$

(generalized Puiseux series)

Series expansion at x = ∞:

$$-\frac{1.02198\times 10^{-8}}{\left(-\frac{1.94765\times 10^{-6}+3.37341\times 10^{-6}\, i}{x^{2/3}}\right)^{3/2} x} + O\left(\left(\frac{1}{x}\right)^{16/3}\right)$$

(generalized Puiseux series)

Derivative:

$$\frac{d}{dx}\left(-\frac{1.02198\times 10^{-8}}{\left(-\frac{1.94765\times 10^{-6}+3.37341\times 10^{-6}\,i}{x^{2/3}}\right)^{3/2} x}\right) =$$

$$\left(3.25622\times 10^{-8} + 1.88002\times 10^{-8}\,i\right)\left(-\frac{1.94765\times 10^{-6} + 3.37341\times 10^{-6}\,i}{x^{2/3}}\right)^{3/2}$$

Indefinite integral:

$$\int -\frac{1.02198\times 10^{-8}}{x\left(\left(\frac{0.000986822-0.00170923\,i}{\sqrt[3]{x}}\right)^{2}\right)^{3/2}}\,dx =$$

$$-\frac{1.02198\times 10^{-8}}{\left(-\frac{1.94765\times 10^{-6}+3.37341\times 10^{-6}\,i}{x^{2/3}}\right)^{3/2}} + \text{constant}$$

Definite integral after subtraction of diverging parts:

$$\int_0^\infty\left(-\frac{1.02198\times 10^{-8}}{\left(-\frac{1.94765\times 10^{-6}+3.37341\times 10^{-6}\,i}{x^{2/3}}\right)^{3/2} x} - -\frac{1.02198\times 10^{-8}}{\left(-\frac{1.94765\times 10^{-6}+3.37341\times 10^{-6}\,i}{x^{2/3}}\right)^{3/2} x}\right)dx =$$

$$0$$

-(1.02198×10^-8)/((0.5(((0.000986822 - 0.00170923 i)/0.5^(1/3))^2)^(3/2)))

Input interpretation:

$$-\frac{1.02198\times 10^{-8}}{0.5\left(\left(\frac{0.000986822+i\times(-0.00170923)}{\sqrt[3]{0.5}}\right)^{2}\right)^{3/2}}$$

i is the imaginary unit

Result:

$1.32933\ldots +$

$4.20085\ldots \times 10^{-6}\, i$

Polar coordinates:

$r = 1.32933$ (radius), $\theta = 3.16012\times 10^{-6}$ (angle)

1.32933

Polar forms:

$$1.32933\left(\cos\left(3.16012\times 10^{-6}\right) + i\sin\left(3.16012\times 10^{-6}\right)\right)$$

$$1.32933\, e^{3.16012\times 10^{-6}\, i}$$

From:

$$-\frac{\lambda}{2}\mu^{2\varepsilon}(m^2)^{1-2\varepsilon}\frac{\Gamma(-1+\varepsilon)}{(4\pi)^{2-\varepsilon}} = \lambda\mu^{2\varepsilon}\frac{m^2}{32\pi^2\varepsilon}$$

Input:

$$-\frac{\lambda}{2}\mu^{2\varepsilon}\left(m^2\right)^{1-2\varepsilon}\times\frac{\Gamma(-1+\varepsilon)}{(4\pi)^{2-\varepsilon}}$$

$\Gamma(x)$ is the gamma function

Exact result:

$$-2^{2\varepsilon-5}\pi^{\varepsilon-2}\lambda\mu^{2\varepsilon}\Gamma(\varepsilon-1)\left(m^2\right)^{1-2\varepsilon}$$

Alternate form assuming m, ε, λ, and μ are real:

$$-2^{2\varepsilon-5}\pi^{\varepsilon-2}\lambda\mu^{2\varepsilon}\Gamma(\varepsilon-1)|m|^{2-4\varepsilon}$$

$|z|$ is the absolute value of z

Alternate form:

$$-2^{2\varepsilon-5}\,\pi^{\varepsilon-2}\,\lambda\,(\varepsilon-2)!\,\mu^{2\varepsilon}\,\left(m^2\right)^{1-2\varepsilon}$$

$n!$ is the factorial function

Roots:

$$m = 0\,, \quad \mathrm{Re}(\varepsilon) < \frac{1}{2}$$

$$\mathrm{Re}(\varepsilon) > 0\,, \quad \mu = 0$$

$$\varepsilon \notin \mathbb{Z}\,, \quad \mu\,m \neq 0\,, \quad \lambda = 0$$

$$m \neq 0\,, \quad \mu \neq 0\,, \quad \mathrm{Re}(\varepsilon) > 1\,, \quad \lambda = 0$$

$\mathrm{Re}(z)$ is the real part of z

$\mathbb{Z}$ is the set of integers

Root:

$$m = 0\,, \quad \mu = 0$$

Series expansion at m = ∞:

$$-2^{2\varepsilon-5}\,\pi^{\varepsilon-2}\,\lambda\,\mu^{2\varepsilon}\,\Gamma(\varepsilon-1)\,m^{2-4\varepsilon}$$

Derivative:

$$\frac{\partial}{\partial m}\left(-\frac{\lambda\,\mu^{2\varepsilon}\,\left(m^2\right)^{1-2\varepsilon}\,\Gamma(-1+\varepsilon)}{2\,(4\,\pi)^{2-\varepsilon}}\right) = (4\,\pi)^{\varepsilon-2}\,(2\,\varepsilon-1)\,\lambda\,m\,\mu^{2\varepsilon}\,\Gamma(-1+\varepsilon)\,\left(m^2\right)^{-2\varepsilon}$$

Indefinite integral:

$$\int -\frac{\lambda\,\mu^{2\varepsilon}\left(m^2\right)^{1-2\varepsilon}\,\Gamma(-1+\varepsilon)}{2\,(4\,\pi)^{2-\varepsilon}}\,dm = \frac{2^{2\varepsilon-5}\,\pi^{\varepsilon-2}\,\lambda\,m^3\,\mu^{2\varepsilon}\,\Gamma(\varepsilon-1)\left(m^2\right)^{-2\varepsilon}}{4\,\varepsilon-3} + \text{constant}$$

Limit:

$$\lim_{m\to\pm\infty} -2^{-5+2\varepsilon}\left(m^2\right)^{1-2\varepsilon}\,\pi^{-2+\varepsilon}\,\lambda\,\mu^{2\varepsilon}\,\Gamma(-1+\varepsilon) = 0 \text{ for } \left(\lambda,\,\mu^{2\varepsilon}\right)\in\mathbb{R}^2 \land \varepsilon > \frac{1}{2}$$

$e_1 \land e_2 \land \ldots$ is the logical AND function

$\mathbb{R}$ is the set of real numbers

Alternative representations:

$$\frac{\left(\mu^{2\varepsilon}\left(m^2\right)^{1-2\varepsilon}\,\Gamma(-1+\varepsilon)\right)(-1)\,\lambda}{2\,(4\,\pi)^{2-\varepsilon}} = -\frac{\lambda\,G(\varepsilon)\,\mu^{2\varepsilon}\left(m^2\right)^{1-2\varepsilon}}{2\,G(-1+\varepsilon)\,(4\,\pi)^{2-\varepsilon}}$$

$$\frac{\left(\mu^{2\varepsilon}\left(m^2\right)^{1-2\varepsilon}\,\Gamma(-1+\varepsilon)\right)(-1)\,\lambda}{2\,(4\,\pi)^{2-\varepsilon}} = -\frac{\lambda\,e^{-\log G(-1+\varepsilon)+\log G(\varepsilon)}\,\mu^{2\varepsilon}\left(m^2\right)^{1-2\varepsilon}}{2\,(4\,\pi)^{2-\varepsilon}}$$

$$\frac{\left(\mu^{2\varepsilon}\left(m^2\right)^{1-2\varepsilon}\,\Gamma(-1+\varepsilon)\right)(-1)\,\lambda}{2\,(4\,\pi)^{2-\varepsilon}} = -\frac{\lambda\,(-2+\varepsilon)!\,\mu^{2\varepsilon}\left(m^2\right)^{1-2\varepsilon}}{2\,(4\,\pi)^{2-\varepsilon}}$$

From:

$$-\frac{\lambda}{2}\,\mu^{2\varepsilon}\left(m^2\right)^{1-2\varepsilon}\times\frac{\Gamma(-1+\varepsilon)}{(4\,\pi)^{2-\varepsilon}}$$

For:

$$x = -5.18182\times 10^{-9}\,y^6$$

λ = -5.18182 * 10^-9   μ = -1

0.00000000518182/2 *((-1)^(2*1/24)) (0.511^2)^(1-2*1/24)   Γ(-1+1/24)/(4π)^(2-1/24)

Input interpretation:

$$\left(\frac{5.18182\times 10^{-9}}{2}\,(-1)^{2\times 1/24}\right)\left(0.511^2\right)^{1-2\times 1/24}\times\frac{\Gamma\left(-1+\frac{1}{24}\right)}{(4\,\pi)^{2-1/24}}$$

$\Gamma(x)$ is the gamma function

Result:

$$-1.25914\ldots\times 10^{-10} - 3.37384\ldots\times 10^{-11}\,i$$

Polar coordinates:

$r = 1.30355\times 10^{-10}$ (radius), $\theta = -2.87979$ (angle)

$1.30355*10^{-10}$

Polar forms:

$$1.30355\times 10^{-10}\,(\cos(-2.87979) + i\sin(-2.87979))$$

$$1.30355\times 10^{-10}\,e^{-2.87979\,i}$$

Alternative representations:

$$\frac{\left(\left(0.511^2\right)^{1-2/24}\,\Gamma\left(-1+\frac{1}{24}\right)\right)5.18182\times 10^{-9}\,(-1)^{2/24}}{(4\,\pi)^{2-1/24}\,2} = \frac{2.59091\times 10^{-9}\,G\left(\frac{1}{24}\right)(-1)^{2/24}\left(0.511^2\right)^{1-2/24}}{G\left(-1+\frac{1}{24}\right)(4\,\pi)^{2-1/24}}$$

$$\frac{\left(\left(0.511^2\right)^{1-2/24}\,\Gamma\left(-1+\frac{1}{24}\right)\right)5.18182\times 10^{-9}\,(-1)^{2/24}}{(4\,\pi)^{2-1/24}\,2} = \frac{2.59091\times 10^{-9}\,(-1)^{2/24}\,e^{-\log G(-1+1/24)+\log G(1/24)}\left(0.511^2\right)^{1-2/24}}{(4\,\pi)^{2-1/24}}$$

$$\frac{\left(\left(0.511^2\right)^{1-2/24}\,\Gamma\left(-1+\frac{1}{24}\right)\right)5.18182\times 10^{-9}\,(-1)^{2/24}}{(4\,\pi)^{2-1/24}\,2} = \frac{2.59091\times 10^{-9}\left(-2+\frac{1}{24}\right)!\,(-1)^{2/24}\left(0.511^2\right)^{1-2/24}}{(4\,\pi)^{2-1/24}}$$

Series representations:

$$\frac{\left(\left(0.511^2\right)^{1-2/24}\,\Gamma\left(-1+\frac{1}{24}\right)\right)5.18182\times 10^{-9}\,(-1)^{2/24}}{(4\,\pi)^{2-1/24}\,2} = -\frac{\left(5.04991\times 10^{-11}+1.35312\times 10^{-11}\,i\right)\sum_{k=0}^{\infty}\frac{\left(-\frac{23}{24}\right)^k\,\Gamma^{(k)}(1)}{k!}}{\pi^{47/24}}$$

$$\frac{\left(\left(0.511^2\right)^{1-2/24}\,\Gamma\left(-1+\frac{1}{24}\right)\right)5.18182\times 10^{-9}\,(-1)^{2/24}}{(4\,\pi)^{2-1/24}\,2} \propto -\frac{\left(2.0401\times 10^{-11}-4.92523\times 10^{-11}\,i\right)e^{23/24}\,\sqrt{2\,\pi}}{\pi^{47/24}} - \frac{1}{\pi^{47/24}}\left(2.0401\times 10^{-11}-4.92523\times 10^{-11}\,i\right)e^{23/24}\,\sqrt{2\,\pi}\,\sum_{k=1}^{\infty}\sum_{j=1}^{2\,k}\frac{\left(-\frac{23}{3}\right)^{-k}(-1)^j\,2^{-j+2\,k}\,\mathcal{D}_{2\,(j+k),j}}{(j+k)!} \quad \text{for False} \quad \text{for } n\le -1+3\,j$$

$$\frac{\left(\left(0.511^2\right)^{1-2/24}\,\Gamma\left(-1+\frac{1}{24}\right)\right)5.18182\times 10^{-9}\,(-1)^{2/24}}{(4\,\pi)^{2-1/24}\,2} = \frac{\left(4.8395\times 10^{-11}+1.29674\times 10^{-11}\,i\right)\sum_{k=0}^{\infty}\frac{\left(-\frac{23}{24}-z_0\right)^k\,\Gamma^{(k)}(z_0)}{k!}}{\pi^{47/24}}$$

$$\text{for } (z_0\notin\mathbb{Z} \text{ or } z_0>0)$$

$$\frac{\left(\left(0.511^2\right)^{1-2/24}\,\Gamma\left(-1+\frac{1}{24}\right)\right)5.18182\times 10^{-9}\,(-1)^{2/24}}{(4\,\pi)^{2-1/24}\,2} = \frac{4.8395\times 10^{-11}+1.29674\times 10^{-11}\,i}{\pi^{23/24}\sum_{k=0}^{\infty}\left(-\frac{23}{24}-z_0\right)^k\sum_{j=0}^{k}\frac{(-1)^j\,\pi^{-j+k}\,\sin\left(\frac{1}{2}\,\pi\,(-j+k+2\,z_0)\right)\Gamma^{(j)}(1-z_0)}{j!\,(-j+k)!}}$$

Integral representations:

$$\frac{\left(\left(0.511^2\right)^{1-2/24}\,\Gamma\left(-1+\frac{1}{24}\right)\right)5.18182\times 10^{-9}\,(-1)^{2/24}}{(4\,\pi)^{2-1/24}\,2} = \frac{\left(4.8395\times 10^{-11}+1.29674\times 10^{-11}\,i\right)\csc\left(-\frac{23\,\pi}{48}\right)}{\pi^{47/24}}\int_0^{\infty}\frac{\sin(t)}{t^{47/24}}\,dt$$

$$\frac{\left(\left(0.511^2\right)^{1-2/24} \Gamma\left(-1+\frac{1}{24}\right)\right) 5.18182\times 10^{-9} (-1)^{2/24}}{(4\pi)^{2-1/24}\, 2} = \frac{\left(9.679\times 10^{-11} + 2.59348\times 10^{-11}\, i\right) i}{\pi^{23/24} \oint_L e^t\, t^{23/24}\, dt}$$

$$\frac{\left(\left(0.511^2\right)^{1-2/24} \Gamma\left(-1+\frac{1}{24}\right)\right) 5.18182\times 10^{-9} (-1)^{2/24}}{(4\pi)^{2-1/24}\, 2} = \frac{4.8395\times 10^{-11} + 1.29674\times 10^{-11}\, i}{\pi^{47/24}} \int_0^\infty \frac{e^{-t} - \sum_{k=0}^{n} \frac{(-t)^k}{k!}}{t^{47/24}}\, dt$$

$$\text{for } \left(n \in \mathbb{Z} \text{ and } 0 \leq n < \frac{23}{24}\right)$$

$\csc(x)$ is the cosecant function

i is the imaginary unit

From

$$\lambda\mu^{2\varepsilon}\ \frac{m^2}{32\pi^2\varepsilon}$$

-5.18182 * 10^-9 * (-1)^(2*1/24) * (0.511^2)/(32Pi^2*1/24)

(((-0.00000000518182* (-1)^(2*1/24)))) * (0.511^2)/(32Pi^2*1/24)

Input interpretation:

$$\left(-5.18182\times 10^{-9}\, (-1)^{2\times 1/24}\right)\times \frac{0.511^2}{32\,\pi^2 \times \frac{1}{24}}$$

Result:

$$-9.93183\ldots \times 10^{-11} - 2.66123\ldots \times 10^{-11}\, i$$

Polar coordinates:

$r = 1.02822 \times 10^{-10}$ (radius), $\theta = -2.87979$ (angle)

$1.02822 * 10^{-10}$

Polar forms:

$$1.02822 \times 10^{-10} (\cos(-2.87979) + i \sin(-2.87979))$$

$$1.02822 \times 10^{-10} e^{-2.87979 i}$$

Alternative representations:

$$\frac{0.511^2 \left(-5.18182 \times 10^{-9}\right) (-1)^{2/24}}{\frac{32 \pi^2}{24}} = -\frac{5.18182 \times 10^{-9} (-1)^{2/24} \, 0.511^2}{\frac{32}{24} (180\,°)^2}$$

$$\frac{0.511^2 \left(-5.18182 \times 10^{-9}\right) (-1)^{2/24}}{\frac{32 \pi^2}{24}} = -\frac{5.18182 \times 10^{-9} (-1)^{2/24} \, 0.511^2}{\frac{192 \zeta(2)}{24}}$$

$$\frac{0.511^2 \left(-5.18182 \times 10^{-9}\right) (-1)^{2/24}}{\frac{32 \pi^2}{24}} = -\frac{5.18182 \times 10^{-9} (-1)^{2/24} \, 0.511^2}{\frac{32}{24} (-i \log(-1))^2}$$

Series representations:

$$\frac{0.511^2 \left(-5.18182 \times 10^{-9}\right) (-1)^{2/24}}{\frac{32 \pi^2}{24}} = -\frac{6.12645 \times 10^{-11} + 1.64158 \times 10^{-11} i}{\left(\sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}\right)^2}$$

$$\frac{0.511^2\left(-5.18182\times 10^{-9}\right)(-1)^{2/24}}{\frac{32\pi^2}{24}} = -\frac{2.45058\times 10^{-10}+6.56631\times 10^{-11}\, i}{\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)^2}$$

$$\frac{0.511^2\left(-5.18182\times 10^{-9}\right)(-1)^{2/24}}{\frac{32\pi^2}{24}} = -\frac{9.80233\times 10^{-10}+2.62653\times 10^{-10}\, i}{\left(\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}\right)^2}$$

Integral representations:

$$\frac{0.511^2\left(-5.18182\times 10^{-9}\right)(-1)^{2/24}}{\frac{32\pi^2}{24}} = -\frac{2.45058\times 10^{-10}+6.56631\times 10^{-11}\, i}{\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^2}$$

$$\frac{0.511^2\left(-5.18182\times 10^{-9}\right)(-1)^{2/24}}{\frac{32\pi^2}{24}} = -\frac{6.12645\times 10^{-11}+1.64158\times 10^{-11}\, i}{\left(\int_0^{1}\sqrt{1-t^2}\,dt\right)^2}$$

$$\frac{0.511^2\left(-5.18182\times 10^{-9}\right)(-1)^{2/24}}{\frac{32\pi^2}{24}} = -\frac{2.45058\times 10^{-10}+6.56631\times 10^{-11}\, i}{\left(\int_0^{\infty}\frac{\sin(t)}{t}\,dt\right)^2}$$

From which:

34/((((((ln((((-0.00000000518182* (-1)^(2*1/24)))) * (0.511^2)/(32Pi^2*1/24))))))+e))

Input interpretation:

$$\frac{34}{\log\left(\left(-5.18182\times10^{-9}\,(-1)^{2\times1/24}\right)\times\frac{0.511^2}{32\pi^2\times\frac{1}{24}}\right)+e}$$

$\log(x)$ is the natural logarithm

Result:

$-1.64341\ldots+$
$0.233370\ldots\,i$

Polar coordinates:

$r = 1.6599$ (radius), $\theta = 3.00053$ (angle)

1.6599 result that is very near to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3 = 1164.2696$ i.e. 1.65578...

Indeed, from:

$$G_{505} = P^{-1/4}Q^{1/6} = (\sqrt{5}+2)^{1/2}\left(\frac{\sqrt{5}+1}{2}\right)^{1/4}(\sqrt{101}+10)^{1/4}$$
$$\times\left((130\sqrt{5}+29\sqrt{101})+\sqrt{169440+7540\sqrt{505}}\right)^{1/6}.$$

Thus, it remains to show that

$$(130\sqrt{5}+29\sqrt{101})+\sqrt{169440+7540\sqrt{505}} = \left(\sqrt{\frac{113+5\sqrt{505}}{8}}+\sqrt{\frac{105+5\sqrt{505}}{8}}\right)^3,$$

which is straightforward. ☐

$$\sqrt[14]{\left(\sqrt{\frac{113+5\sqrt{505}}{8}}+\sqrt{\frac{105+5\sqrt{505}}{8}}\right)^3} = 1{,}65578\ldots$$

Polar forms:

$$1.6599\,(\cos(3.00053) + i\,\sin(3.00053))$$

$$1.6599\,e^{3.00053\,i}$$

Alternative representations:

$$\frac{34}{\log\left(\frac{0.511^2\,(-5.18182\times 10^{-9})(-1)^{2/24}}{\frac{32\,\pi^2}{24}}\right)+e} = \frac{34}{e+\log_e\left(-\frac{5.18182\times 10^{-9}\,(-1)^{2/24}\,0.511^2}{\frac{32\,\pi^2}{24}}\right)}$$

$$\frac{34}{\log\left(\frac{0.511^2\,(-5.18182\times 10^{-9})(-1)^{2/24}}{\frac{32\,\pi^2}{24}}\right)+e} = \frac{34}{e+\log(a)\,\log_a\left(-\frac{5.18182\times 10^{-9}\,(-1)^{2/24}\,0.511^2}{\frac{32\,\pi^2}{24}}\right)}$$

$$\frac{34}{\log\left(\frac{0.511^2\,(-5.18182\times 10^{-9})(-1)^{2/24}}{\frac{32\,\pi^2}{24}}\right)+e} = \frac{34}{e-\mathrm{Li}_1\left(1+\frac{5.18182\times 10^{-9}\,(-1)^{2/24}\,0.511^2}{\frac{32\,\pi^2}{24}}\right)}$$

Series representations:

$$\frac{34}{\log\left(\frac{0.511^2\,(-5.18182\times 10^{-9})(-1)^{2/24}}{\frac{32\,\pi^2}{24}}\right)+e} =$$

$$34\left/\left(e+\log\left(-1-\frac{9.80233\times 10^{-10}+2.62653\times 10^{-10}\,i}{\pi^2}\right)-\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1-\frac{9.80233\times 10^{-10}+2.62653\times 10^{-10}\,i}{\pi^2}\right)^{-k}}{k}\right)\right.$$

$$\frac{34}{\log\left(\frac{0.511^2\left(-5.18182\times10^{-9}\right)(-1)^{2/24}}{\frac{32\,\pi^2}{24}}\right)+e} = 34\Bigg/\left(e+2\,i\,\pi\left\lfloor\frac{\arg\left(-\frac{9.80233\times10^{-10}+2.62653\times10^{-10}\,i}{\pi^2}-x\right)}{2\,\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k\left(-\frac{9.80233\times10^{-10}+2.62653\times10^{-10}\,i}{\pi^2}-x\right)^k x^{-k}}{k}\right) \quad \text{for } x<0$$

$$\frac{34}{\log\left(\frac{0.511^2\left(-5.18182\times10^{-9}\right)(-1)^{2/24}}{\frac{32\,\pi^2}{24}}\right)+e} = 34\Bigg/\left(e+\log(z_0)+\left\lfloor\frac{\arg\left(-\frac{9.80233\times10^{-10}+2.62653\times10^{-10}\,i}{\pi^2}-z_0\right)}{2\,\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k\left(-\frac{9.80233\times10^{-10}+2.62653\times10^{-10}\,i}{\pi^2}-z_0\right)^k z_0^{-k}}{k}\right)$$

Integral representations:

$$\frac{34}{\log\left(\frac{0.511^2\left(-5.18182\times10^{-9}\right)(-1)^{2/24}}{\frac{32\,\pi^2}{24}}\right)+e} = \frac{34}{e+\int_1^{-\frac{9.80233\times10^{-10}+2.62653\times10^{-10}\,i}{\pi^2}}\frac{1}{t}\,dt}$$

$$\frac{34}{\log\left(\frac{0.511^2\left(-5.18182\times10^{-9}\right)(-1)^{2/24}}{\frac{32\,\pi^2}{24}}\right)+e} = \frac{68\,i\,\pi}{2\,e\,i\,\pi+\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{\left(-1-\frac{9.80233\times10^{-10}+2.62653\times10^{-10}\,i}{\pi^2}\right)^{-s}\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds} \quad \text{for } -1<\gamma<0$$

From:

$$\left(-5.18182\times 10^{-9}\,(-1)^{2\times 1/24}\right)\times \frac{0.511^2}{32\,\pi^2\times \frac{1}{24}}$$

we obtain:

((((((-0.00000000518182* (-1)^(2*1/24)))) * 3/2*(0.511^2)))) / ((((1.02822×10^-10)*2)))

Input interpretation:

$$\frac{\left(-5.18182\times 10^{-9}\,(-1)^{2\times 1/24}\right)\times \frac{3}{2}\times 0.511^2}{1.02822\times 10^{-10}\times 2}$$

Result:

$$-9.53330\ldots - 2.55444\ldots\, i$$

Polar coordinates:

$r = 9.8696$ (radius), $\theta = -2.87979$ (angle)

$9.8696 = \pi^2$

And:

1/6((((((-0.00000000518182* (-1)^(2*1/24)))) * 3/2*(0.511^2)))) / ((((1.02822×10^-10)*2)))

Input interpretation:

$$\frac{1}{6}\times \frac{\left(-5.18182\times 10^{-9}\,(-1)^{2\times 1/24}\right)\times \frac{3}{2}\times 0.511^2}{1.02822\times 10^{-10}\times 2}$$

Result:

$$-1.58888\ldots - 0.425740\ldots\, i$$

Polar coordinates:

$r = 1.64493$ (radius), $\theta = -2.87979$ (angle)

$1.64493 = \zeta(2) = \frac{\pi^2}{6}$

Furthermore:

sqrt[((((((-0.00000000518182* (-1)^(2*1/24)))) * 3/2*(0.511^2)))) / ((((1.02822×10^-10)*2)))]

Input interpretation:

$$\sqrt{\frac{\left(-5.18182\times 10^{-9}\,(-1)^{2\times 1/24}\right)\times\frac{3}{2}\times 0.511^2}{1.02822\times 10^{-10}\times 2}}$$

Result:

$0.410060\ldots -$
$3.11471\ldots\, i$

Polar coordinates:

$r = 3.14159$ (radius), $\theta = -1.4399$ (angle)

$3.14159 = \pi$

From:

$$\left(-5.18182\times 10^{-9}\,(-1)^{2\times 1/24}\right)\times\frac{0.511^2}{32\,\pi^2\times\frac{1}{24}}$$

(((-0.00000000518182* (-1)^(2*1/24)))) * (0.511^2)/(32Pi^2*1/24)

For ((((√(10-2√5) -2))⁄((√5-1)))) = 8πG; G = 0.011303146014

[2Pi((((√(10-2√5) -2))⁄((√5-1))))]/(0.011303146014) we obtain:

0.932394 (((-0.00000000518182*(-1)^(2*1/24))))*(0.511^2)/(([4Pi((((√(10-2√5) -2))/((√5-1)))^(2*1.65578))]/(0.011303146014))^2*1/24)

Input interpretation:

$$0.932394\left(-5.18182\times 10^{-9}\,(-1)^{2\times 1/24}\right)\times \frac{0.511^2}{\left(\frac{4\pi\left(\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)^{2\times 1.65578}}{0.011303146014}\right)^2\times\frac{1}{24}}$$

Result:

$$-9.86269\ldots\times 10^{-11} -$$
$$2.64270\ldots\times 10^{-11}\,i$$

Polar coordinates:

$r = 1.02106\times 10^{-10}$ (radius), $\theta = -2.87979$ (angle)

1.02106*10^{-10}

Polar forms:

$$1.02106\times 10^{-10}\,(\cos(-2.87979) + i\sin(-2.87979))$$

$$1.02106\times 10^{-10}\,e^{-2.87979\,i}$$

Series representations:

$$\frac{\left(0.932394\times 0.511^{2}\right)\left(-5.18182\times 10^{-9}\right)(-1)^{2/24}}{\frac{1}{24}\left(\frac{4\pi\left(\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)^{2\times 1.65578}}{0.0113031460140000}\right)^{2}}=$$

$$-\frac{2.33538\times 10^{-13}+6.25763\times 10^{-14}\,i}{\pi^{2}\left(\frac{-2+\sqrt{9-2\sqrt{5}}\,\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}}{-1+\sqrt{4}\,\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}}\right)^{6.62312}}$$

$$\frac{\left(0.932394\times 0.511^{2}\right)\left(-5.18182\times 10^{-9}\right)(-1)^{2/24}}{\frac{1}{24}\left(\frac{4\pi\left(\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)^{2\times 1.65578}}{0.0113031460140000}\right)^{2}}=$$

$$-\frac{2.33538\times 10^{-13}+6.25763\times 10^{-14}\,i}{\pi^{2}\left(\frac{-2+\sqrt{9-2\sqrt{5}}\,\sum_{k=0}^{\infty}\frac{(-1)^{k}\left(-\frac{1}{2}\right)_{k}\left(9-2\sqrt{5}\right)^{-k}}{k!}}{-1+\sqrt{4}\,\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^{k}\left(-\frac{1}{2}\right)_{k}}{k!}}\right)^{6.62312}}$$

$$\frac{\left(0.932394\times 0.511^{2}\right)\left(-5.18182\times 10^{-9}\right)(-1)^{2/24}}{\frac{1}{24}\left(\frac{4\pi\left(\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)^{2\times 1.65578}}{0.0113031460140000}\right)^{2}}=$$

$$-\frac{2.33538\times 10^{-13}+6.25763\times 10^{-14}\,i}{\pi^{2}\left(\frac{-2+\sqrt{z_0}\,\sum_{k=0}^{\infty}\frac{(-1)^{k}\left(-\frac{1}{2}\right)_{k}\left(10-2\sqrt{5}-z_0\right)^{k}z_0^{-k}}{k!}}{-1+\sqrt{z_0}\,\sum_{k=0}^{\infty}\frac{(-1)^{k}\left(-\frac{1}{2}\right)_{k}\left(5-z_0\right)^{k}z_0^{-k}}{k!}}\right)^{6.62312}}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \le 0$))

From which:

34/((ln+(0.932394 (((-0.00000000518182*(-1)^(2*1/24))))*(0.511^2)/(([4Pi((((√(10-2√5) -2))⁄((√5-1)))^(2*1.65578))]/(0.011303146014))^2*1/24))+sqrt(2Pi)))

Input interpretation:

$$34 \Bigg/ \left(\log \left(+ \left(0.932394 \left(-5.18182\times 10^{-9} (-1)^{2\times 1/24}\right) \times \frac{0.511^2}{\left(\frac{4\pi \left(\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)^{2\times 1.65578}}{0.011303146014}\right)^2 \times \frac{1}{24}}\right)\right) + \sqrt{2\pi}\right)$$

log(x) is the natural logarithm

Result:

$-1.62656\ldots + 0.228514\ldots i$

Polar coordinates:

$r = 1.64254$ (radius), $\theta = 3.00202$ (angle)

$1.64254 \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Polar forms:

$$1.64254\,(\cos(3.00202) + i\sin(3.00202))$$

$$1.64254\,e^{3.00202\,i}$$

Alternative representations:

$$\frac{34}{\log\left(+\frac{\left(0.932394\times 0.511^2\right)\left(-5.18182\times 10^{-9}\right)(-1)^{2/24}}{\frac{1}{24}\left(\frac{4\pi\left(\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)^{2\times 1.65578}}{0.0113031460140000}\right)^2}\right)+\sqrt{2\pi}} = \frac{34}{\log_e\left(-\frac{4.8315\times 10^{-9}\,(-1)^{2/24}\,0.511^2}{\frac{1}{24}\left(\frac{4\pi\left(\frac{-2+\sqrt{10-2\sqrt{5}}}{-1+\sqrt{5}}\right)^{3.31156}}{0.0113031460140000}\right)^2}\right)+\sqrt{2\pi}}$$

$$\frac{34}{\log\left(+\frac{(0.932394\times 0.511^2)(-5.18182\times 10^{-9})(-1)^{2/24}}{\frac{1}{24}\left(\frac{4\pi\left(\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)^{2\times 1.65578}}{0.0113031460140000}\right)^2}\right)+\sqrt{2\pi}} =$$

$$\frac{34}{\log(a)\log_a\left(-\frac{4.8315\times 10^{-9}\,(-1)^{2/24}\,0.511^2}{\frac{1}{24}\left(\frac{4\pi\left(\frac{-2+\sqrt{10-2\sqrt{5}}}{-1+\sqrt{5}}\right)^{3.31156}}{0.0113031460140000}\right)^2}\right)+\sqrt{2\pi}}$$

$$\frac{34}{\log\left(+\frac{(0.932394\times 0.511^2)(-5.18182\times 10^{-9})(-1)^{2/24}}{\frac{1}{24}\left(\frac{4\pi\left(\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)^{2\times 1.65578}}{0.0113031460140000}\right)^2}\right)+\sqrt{2\pi}} =$$

$$\frac{34}{-\mathrm{Li}_1\left(1+\frac{4.8315\times 10^{-9}\,(-1)^{2/24}\,0.511^2}{\frac{1}{24}\left(\frac{4\pi\left(\frac{-2+\sqrt{10-2\sqrt{5}}}{-1+\sqrt{5}}\right)^{3.31156}}{0.0113031460140000}\right)^2}\right)+\sqrt{2\pi}}$$

Series representations:

$$\frac{34}{\log\left(+\frac{(0.932394\times 0.511^2)(-5.18182\times 10^{-9})(-1)^{2/24}}{\frac{1}{24}\left(\frac{4\pi\left(\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)^{2\times 1.65578}}{0.0113031460140000}\right)^2}\right)+\sqrt{2\pi}}=$$

$$34\Bigg/\left(\log\left(-1-\frac{2.33538\times 10^{-13}+6.25763\times 10^{-14}\,i}{\pi^2\left(\frac{-2+\sqrt{10-2\sqrt{5}}}{-1+\sqrt{5}}\right)^{6.62312}}\right)+\sqrt{-1+2\pi}\right.$$

$$\left.\sum_{k=0}^{\infty}(-1+2\pi)^{-k}\binom{\frac{1}{2}}{k}-\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1-\frac{2.33538\times 10^{-13}+6.25763\times 10^{-14}\,i}{\pi^2\left(\frac{-2+\sqrt{10-2\sqrt{5}}}{-1+\sqrt{5}}\right)^{6.62312}}\right)^{-k}}{k}\right)$$

$$\frac{34}{\log\left(+\frac{(0.932394\times 0.511^{2})(-5.18182\times 10^{-9})(-1)^{2/24}}{\frac{1}{24}\left(\frac{4\pi\left(\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)^{2\times 1.65578}}{0.0113031460140000}\right)^{2}}\right)+\sqrt{2\pi}}=$$

$$34\Bigg/\left(\log\left(-1-\frac{2.33538\times 10^{-13}+6.25763\times 10^{-14}\,i}{\pi^{2}\left(\frac{-2+\sqrt{10-2\sqrt{5}}}{-1+\sqrt{5}}\right)^{6.62312}}\right)+\right.$$

$$\sqrt{-1+2\pi}\sum_{k=0}^{\infty}\frac{(-1)^{k}\,(-1+2\pi)^{-k}\left(-\frac{1}{2}\right)_{k}}{k!}-$$

$$\left.\sum_{k=1}^{\infty}\frac{(-1)^{k}\left(-1-\frac{2.33538\times 10^{-13}+6.25763\times 10^{-14}\,i}{\pi^{2}\left(\frac{-2+\sqrt{10-2\sqrt{5}}}{-1+\sqrt{5}}\right)^{6.62312}}\right)^{-k}}{k}\right)$$

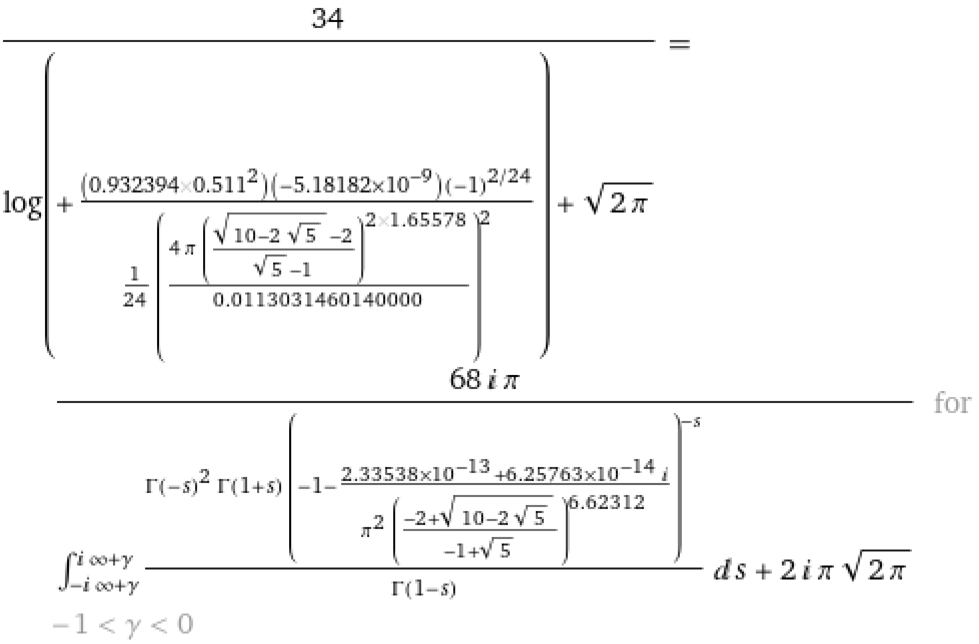
$$\frac{34}{\log\left(+\frac{\left(0.932394\times 0.511^2\right)\left(-5.18182\times 10^{-9}\right)(-1)^{2/24}}{\frac{1}{24}\left(\frac{4\pi\left(\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)^{2\times 1.65578}}{0.0113031460140000}\right)^2}\right)+\sqrt{2\pi}}=$$

$$34\Bigg/\left(\log\left(-\frac{2.33538\times 10^{-13}+6.25763\times 10^{-14}\,i}{\pi^2\left(\frac{-2+\sqrt{9-2\sqrt{5}}\,\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}}{-1+\sqrt{4}\,\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}}\right)^{6.62312}}\right)+\sqrt{-1+2\pi}\,\sum_{k=0}^{\infty}(-1+2\pi)^{-k}\binom{\frac{1}{2}}{k}\right)$$

Integral representations:

$$\frac{34}{\log\left(+\frac{\left(0.932394\times 0.511^2\right)\left(-5.18182\times 10^{-9}\right)(-1)^{2/24}}{\frac{1}{24}\left(\frac{4\pi\left(\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)^{2\times 1.65578}}{0.0113031460140000}\right)^2}\right)+\sqrt{2\pi}}=$$

$$\frac{34}{\int_1^{-\frac{2.33538\times 10^{-13}+6.25763\times 10^{-14}\,i}{\pi^2\left(\frac{-2+\sqrt{10-2\sqrt{5}}}{-1+\sqrt{5}}\right)^{6.62312}}}\frac{1}{t}\,dt+\sqrt{2\pi}}$$



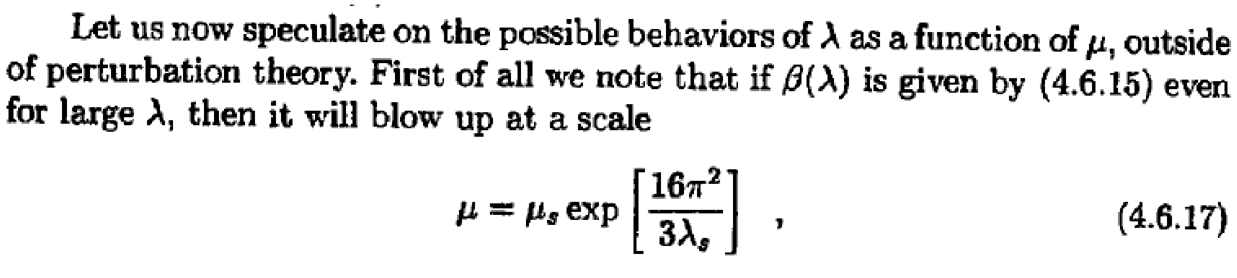
$$\frac{34}{\log\left(+\frac{(0.932394\times0.511^2)(-5.18182\times10^{-9})(-1)^{2/24}}{\frac{1}{24}\left(\frac{4\pi\left(\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)^{2\times1.65578}}{0.0113031460140000}\right)^2}\right)+\sqrt{2\pi}} =$$

$$\frac{68\,i\,\pi}{\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{\Gamma(-s)^2\,\Gamma(1+s)\left(-1-\frac{2.33538\times10^{-13}+6.25763\times10^{-14}\,i}{\pi^2\left(\frac{-2+\sqrt{10-2\sqrt{5}}}{-1+\sqrt{5}}\right)^{6.62312}}\right)^{-s}}{\Gamma(1-s)}\,ds+2\,i\,\pi\sqrt{2\pi}} \text{ for } -1<\gamma<0$$

From:

Field Theory: A Modern Primer - *By Pierre Ramond* - Copyright Year 1997

We have that:



Let us now speculate on the possible behaviors of λ as a function of μ, outside of perturbation theory. First of all we note that if $\beta(\lambda)$ is given by (4.6.15) even for large λ, then it will blow up at a scale

$$\mu = \mu_s \exp\left[\frac{16\pi^2}{3\lambda_s}\right] \quad , \qquad (4.6.17)$$

by a change in λ to as to leave (4.6.10) invariant. Let us now evaluate β in perturbation theory. Using (4.5.43) we find

$$\mu\frac{\partial\lambda}{\partial\mu}=\frac{3\lambda^2}{16\pi^2}+\mathcal{O}(\lambda^3)\ . \tag{4.6.15}$$

Neglecting the terms of $\mathcal{O}(\lambda^3)$, we can easily integrate (4.6.15), obtaining

$$\lambda=\lambda_s\frac{1}{1-\frac{3}{16\pi^2}\lambda_s\ln\frac{\mu}{\mu_s}}\ , \tag{4.6.16}$$

where λ_s is the value of λ at some scale μ_s.

It is clear from (4.6.15) that λ increases with μ. Thus, is we start with a small λ_s ($<<1$) at a given scale μ_s, the effective coupling constant will increase with μ. In so doing, we will have to deal with larger and larger λ and will therefore leave the domain of validity of perturbation theory: $\lambda<<1$, or more exactly $\frac{3}{16\pi^2}\lambda_s\ln\frac{\mu}{\mu_s}<<1$. Thus at shorter distances, we have to add more and more contributions to the right hand side of (4.6.15).

$$\lambda=\lambda_s\frac{1}{1-\frac{3}{16\pi^2}\lambda_s\ln\frac{\mu}{\mu_s}}\ ,$$

$$\mu=\mu_s\exp\left[\frac{16\pi^2}{3\lambda_s}\right]\ ,$$

For $\lambda = -1$

((-1/(1+(3/(16Pi^2))))) * ln[(((exp((16Pi^2)/(-3)))))]

Input:

$$-\frac{\log\left(\exp\left(-\frac{1}{3}\left(16\pi^2\right)\right)\right)}{1+\frac{3}{16\pi^2}}$$

$\log(x)$ is the natural logarithm

Exact result:

$$\frac{16\pi^2}{3\left(1+\frac{3}{16\pi^2}\right)}$$

Decimal approximation:

51.656533676340661408292225711916826553016585287120035199000849591
…

51.656533…

Property:

$\frac{16\pi^2}{3\left(1+\frac{3}{16\pi^2}\right)}$ is a transcendental number

Alternate forms:

$$\frac{256\pi^4}{9+48\pi^2}$$

$$\frac{256\pi^4}{3\left(3+16\pi^2\right)}$$

$$-1+\frac{16\pi^2}{3}+\frac{3}{3+16\pi^2}$$

Alternative representations:

$$\frac{\log\left(\exp\left(-\frac{16\pi^2}{3}\right)\right)(-1)}{1+\frac{3}{16\pi^2}}=-\frac{\log_e\left(\exp\left(-\frac{16\pi^2}{3}\right)\right)}{1+\frac{3}{16\pi^2}}$$

$$\frac{\log\left(\exp\left(-\frac{16\pi^2}{3}\right)\right)(-1)}{1+\frac{3}{16\pi^2}} = -\frac{\log(a)\log_a\left(\exp\left(-\frac{16\pi^2}{3}\right)\right)}{1+\frac{3}{16\pi^2}}$$

Series representations:

$$\frac{\log\left(\exp\left(-\frac{16\pi^2}{3}\right)\right)(-1)}{1+\frac{3}{16\pi^2}} = \frac{32\sum_{k=1}^{\infty}\frac{1}{k^2}}{1+\frac{3}{16\pi^2}}$$

$$\frac{\log\left(\exp\left(-\frac{16\pi^2}{3}\right)\right)(-1)}{1+\frac{3}{16\pi^2}} = -\frac{64\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}}{1+\frac{3}{16\pi^2}}$$

$$\frac{\log\left(\exp\left(-\frac{16\pi^2}{3}\right)\right)(-1)}{1+\frac{3}{16\pi^2}} = \frac{2048\,\pi^2\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}}{9+48\pi^2}$$

Integral representations:

$$\frac{\log\left(\exp\left(-\frac{16\pi^2}{3}\right)\right)(-1)}{1+\frac{3}{16\pi^2}} = \frac{4096\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^4}{3\left(3+64\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^2\right)}$$

$$\frac{\log\left(\exp\left(-\frac{16\pi^2}{3}\right)\right)(-1)}{1+\frac{3}{16\pi^2}} = \frac{4096\left(\int_0^{\infty}\frac{\sin(t)}{t}\,dt\right)^4}{3\left(3+64\left(\int_0^{\infty}\frac{\sin(t)}{t}\,dt\right)^2\right)}$$

$$\frac{\log\left(\exp\left(-\frac{16\pi^2}{3}\right)\right)(-1)}{1+\frac{3}{16\pi^2}} = \frac{4096\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt\right)^4}{3\left(3+64\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt\right)^2\right)}$$

We have also:

51.6565 1/ ((((integral_0^∞ 1/(1 + t^2) dt)^4) 1/(3 (3 + 64 (integral_0^∞ 1/(1 + t^2) dt)^2))))

Input interpretation:

$$51.6565\times\frac{1}{\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^4\times\frac{1}{3\left(3+64\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2\right)}}$$

Result:

4096.

4096

Computation result:

$$\frac{51.6565}{\frac{\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^4}{3\left(3+64\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2\right)}} = 4096.$$

With regard 4096, we observe that:

From:

Modular equations and approximations to π – *Srinivasa Ramanujan*
Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

We have that:

$$g_{22} = \sqrt{(1+\sqrt{2})}.$$

Hence

$$\begin{aligned} 64g_{22}^{24} &= e^{\pi\sqrt{22}} - 24 + 276e^{-\pi\sqrt{22}} - \cdots, \\ 64g_{22}^{-24} &= \qquad\qquad\qquad 4096e^{-\pi\sqrt{22}} + \cdots, \end{aligned}$$

so that

$$64(g_{22}^{24} + g_{22}^{-24}) = e^{\pi\sqrt{22}} - 24 + 4372e^{-\pi\sqrt{22}} + \cdots = 64\{(1+\sqrt{2})^{12} + (1-\sqrt{2})^{12}\}.$$

Hence

$$e^{\pi\sqrt{22}} = 2508951.9982\ldots.$$

From:

$$e^{\pi\sqrt{22}} - 24 + 4372e^{-\pi\sqrt{22}} + \cdots = 64\{(1+\sqrt{2})^{12} + (1-\sqrt{2})^{12}\}.$$

we obtain:

e^(Pi*sqrt22)-24+(4096+276)*e^(-Pi*sqrt22) ≤ 64[(1+sqrt2)^12+(1-sqrt2)^12]

Input:

$$e^{\pi\sqrt{22}} - 24 + (4096+276)\,e^{-\pi\sqrt{22}} \le 64\left(\left(1+\sqrt{2}\right)^{12} + \left(1-\sqrt{2}\right)^{12}\right)$$

Result:

True

Difference:

-1.25729×10^{-8}

(((e^(Pi*sqrt22)-24+(4096+276)*e^(-Pi*sqrt22)))) / [(1+sqrt2)^12+(1-sqrt2)^12]

Input:

$$\frac{e^{\pi\sqrt{22}} - 24 + (4096+276)\,e^{-\pi\sqrt{22}}}{\left(1+\sqrt{2}\right)^{12} + \left(1-\sqrt{2}\right)^{12}}$$

Exact result:

$$\frac{-24 + 4372\, e^{-\sqrt{22}\,\pi} + e^{\sqrt{22}\,\pi}}{\left(1 - \sqrt{2}\right)^{12} + \left(1 + \sqrt{2}\right)^{12}}$$

Decimal approximation:

63.999999999999609934885376148279313056461182496638448289956033565
...

63.9999999….≈ 64

Property:

$$\frac{-24 + 4372\, e^{-\sqrt{22}\,\pi} + e^{\sqrt{22}\,\pi}}{\left(1 - \sqrt{2}\right)^{12} + \left(1 + \sqrt{2}\right)^{12}} \text{ is a transcendental number}$$

Alternate form:

$$\frac{-24 + 4372\, e^{-\sqrt{22}\,\pi} + e^{\sqrt{22}\,\pi}}{39\,202}$$

Expanded forms:

$$-\frac{24}{\left(1 - \sqrt{2}\right)^{12} + \left(1 + \sqrt{2}\right)^{12}} + \frac{4372\, e^{-\sqrt{22}\,\pi}}{\left(1 - \sqrt{2}\right)^{12} + \left(1 + \sqrt{2}\right)^{12}} + \frac{e^{\sqrt{22}\,\pi}}{\left(1 - \sqrt{2}\right)^{12} + \left(1 + \sqrt{2}\right)^{12}}$$

$$-\frac{12}{19\,601} + \frac{2186\, e^{-\sqrt{22}\,\pi}}{19\,601} + \frac{e^{\sqrt{22}\,\pi}}{39\,202}$$

Series representations:

$$
\begin{aligned}
&\frac{e^{\pi\sqrt{22}} - 24 + (4096 + 276)\, e^{-\pi\sqrt{22}}}{\left(1+\sqrt{2}\right)^{12} + \left(1-\sqrt{2}\right)^{12}} = \\
&-\left(24 \middle/ \left(\left(1 - \exp\left(i\,\pi \left\lfloor \frac{\arg(2-x)}{2\,\pi} \right\rfloor\right) \sqrt{x}\, \sum_{k=0}^{\infty} \frac{(-1)^k\, (2-x)^k\, x^{-k} \left(-\frac{1}{2}\right)_k}{k!}\right)^{12} + \right.\right. \\
&\qquad \left.\left. \left(1 + \exp\left(i\,\pi \left\lfloor \frac{\arg(2-x)}{2\,\pi} \right\rfloor\right) \sqrt{x}\, \sum_{k=0}^{\infty} \frac{(-1)^k\, (2-x)^k\, x^{-k} \left(-\frac{1}{2}\right)_k}{k!}\right)^{12}\right)\right) + \\
&\quad \left(4372 \exp\left(-\pi \exp\left(i\,\pi \left\lfloor \frac{\arg(22-x)}{2\,\pi} \right\rfloor\right) \sqrt{x}\, \sum_{k=0}^{\infty} \frac{(-1)^k\, (22-x)^k\, x^{-k} \left(-\frac{1}{2}\right)_k}{k!}\right)\right) \Big/ \\
&\quad \left(\left(1 - \exp\left(i\,\pi \left\lfloor \frac{\arg(2-x)}{2\,\pi} \right\rfloor\right) \sqrt{x}\, \sum_{k=0}^{\infty} \frac{(-1)^k\, (2-x)^k\, x^{-k} \left(-\frac{1}{2}\right)_k}{k!}\right)^{12} + \right. \\
&\qquad \left. \left(1 + \exp\left(i\,\pi \left\lfloor \frac{\arg(2-x)}{2\,\pi} \right\rfloor\right) \sqrt{x}\, \sum_{k=0}^{\infty} \frac{(-1)^k\, (2-x)^k\, x^{-k} \left(-\frac{1}{2}\right)_k}{k!}\right)^{12}\right) + \\
&\quad \exp\left(\pi \exp\left(i\,\pi \left\lfloor \frac{\arg(22-x)}{2\,\pi} \right\rfloor\right) \sqrt{x}\, \sum_{k=0}^{\infty} \frac{(-1)^k\, (22-x)^k\, x^{-k} \left(-\frac{1}{2}\right)_k}{k!}\right) \Big/ \\
&\quad \left(\left(1 - \exp\left(i\,\pi \left\lfloor \frac{\arg(2-x)}{2\,\pi} \right\rfloor\right) \sqrt{x}\, \sum_{k=0}^{\infty} \frac{(-1)^k\, (2-x)^k\, x^{-k} \left(-\frac{1}{2}\right)_k}{k!}\right)^{12} + \right. \\
&\qquad \left. \left(1 + \exp\left(i\,\pi \left\lfloor \frac{\arg(2-x)}{2\,\pi} \right\rfloor\right) \sqrt{x}\, \sum_{k=0}^{\infty} \frac{(-1)^k\, (2-x)^k\, x^{-k} \left(-\frac{1}{2}\right)_k}{k!}\right)^{12}\right)
\end{aligned}
$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{e^{\pi\sqrt{22}} - 24 + (4096 + 276)\, e^{-\pi\sqrt{22}}}{\left(1+\sqrt{2}\right)^{12} + \left(1-\sqrt{2}\right)^{12}} =$$

$$\left(\exp\left(-\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (22-z_0)^k z_0^{-k}}{k!}\right)\right.$$

$$\left(4372 - 24\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (22-z_0)^k z_0^{-k}}{k!}\right)+\right.$$

$$\left.\left.\exp\left(2\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (22-z_0)^k z_0^{-k}}{k!}\right)\right)\right)\Big/$$

$$\left(2\left(1 + 6\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (2-z_0)^k z_0^{-k}}{k!}\right)^2 +\right.\right.$$

$$\left.\sqrt{z_0}^{\,4}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (2-z_0)^k z_0^{-k}}{k!}\right)^4\right)$$

$$\left(1 + 60\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (2-z_0)^k z_0^{-k}}{k!}\right)^2 +\right.$$

$$134\sqrt{z_0}^{\,4}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (2-z_0)^k z_0^{-k}}{k!}\right)^4 +$$

$$60\sqrt{z_0}^{\,6}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (2-z_0)^k z_0^{-k}}{k!}\right)^6 +$$

$$\left.\left.\sqrt{z_0}^{\,8}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (2-z_0)^k z_0^{-k}}{k!}\right)^8\right)\right)$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{e^{\pi\sqrt{22}} - 24 + (4096 + 276)\, e^{-\pi\sqrt{22}}}{\left(1+\sqrt{2}\right)^{12} + \left(1-\sqrt{2}\right)^{12}} =$$

$$-\left(24 \Big/ \left(\left(1 - \left(\frac{1}{z_0}\right)^{1/2 \lfloor \arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2 (1+\lfloor \arg(2-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}\right)^{12} + \left(1 + \left(\frac{1}{z_0}\right)^{1/2 \lfloor \arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2 (1+\lfloor \arg(2-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}\right)^{12}\right)\right) +$$

$$\left(4372 \exp\left(-\pi \left(\frac{1}{z_0}\right)^{1/2 \lfloor \arg(22-z_0)/(2\pi)\rfloor} z_0^{1/2 (1+\lfloor \arg(22-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (22-z_0)^k\, z_0^{-k}}{k!}\right)\right) \Big/$$

$$\left(\left(1 - \left(\frac{1}{z_0}\right)^{1/2 \lfloor \arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2 (1+\lfloor \arg(2-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}\right)^{12} + \left(1 + \left(\frac{1}{z_0}\right)^{1/2 \lfloor \arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2 (1+\lfloor \arg(2-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}\right)^{12}\right) +$$

$$\exp\left(\pi \left(\frac{1}{z_0}\right)^{1/2 \lfloor \arg(22-z_0)/(2\pi)\rfloor} z_0^{1/2 (1+\lfloor \arg(22-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (22-z_0)^k\, z_0^{-k}}{k!}\right) \Big/$$

$$\left(\left(1 - \left(\frac{1}{z_0}\right)^{1/2 \lfloor \arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2 (1+\lfloor \arg(2-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}\right)^{12} + \left(1 + \left(\frac{1}{z_0}\right)^{1/2 \lfloor \arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2 (1+\lfloor \arg(2-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}\right)^{12}\right)$$

and:

2*((((((e^(Pi*sqrt22)-24+(4096+276)*e^(-Pi*sqrt22)))) / [(1+sqrt2)^12+(1-sqrt2)^12])))^2

Input:

$$2\left(\frac{e^{\pi\sqrt{22}}-24+(4096+276)\,e^{-\pi\sqrt{22}}}{\left(1+\sqrt{2}\right)^{12}+\left(1-\sqrt{2}\right)^{12}}\right)^2$$

Exact result:

$$\frac{2\left(-24+4372\,e^{-\sqrt{22}\,\pi}+e^{\sqrt{22}\,\pi}\right)^2}{\left(\left(1-\sqrt{2}\right)^{12}+\left(1+\sqrt{2}\right)^{12}\right)^2}$$

Decimal approximation:

8191.9999999999001433306562942638057297470998821132198601585165223…

8191.99999…..≈ 8192

The total amplitude vanishes for gauge group SO(8192), while the vacuum energy is negative and independent of the gauge group.

The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). (From: "Dilaton Tadpole for the Open Bosonic String " Michael R. Douglas and Benjamin Grinstein - September 2,1986)

Property:

$$\frac{2\left(-24+4372\,e^{-\sqrt{22}\,\pi}+e^{\sqrt{22}\,\pi}\right)^2}{\left(\left(1-\sqrt{2}\right)^{12}+\left(1+\sqrt{2}\right)^{12}\right)^2} \text{ is a transcendental number}$$

Alternate form:

$$\frac{\left(-24+4372\,e^{-\sqrt{22}\,\pi}+e^{\sqrt{22}\,\pi}\right)^2}{768\,398\,402}$$

Expanded forms:

$$\frac{18\,640}{\left(\left(1-\sqrt{2}\right)^{12}+\left(1+\sqrt{2}\right)^{12}\right)^2}+\frac{38\,228\,768\,e^{-2\sqrt{22}\,\pi}}{\left(\left(1-\sqrt{2}\right)^{12}+\left(1+\sqrt{2}\right)^{12}\right)^2}-\frac{419\,712\,e^{-\sqrt{22}\,\pi}}{\left(\left(1-\sqrt{2}\right)^{12}+\left(1+\sqrt{2}\right)^{12}\right)^2}-\frac{96\,e^{\sqrt{22}\,\pi}}{\left(\left(1-\sqrt{2}\right)^{12}+\left(1+\sqrt{2}\right)^{12}\right)^2}+\frac{2\,e^{2\sqrt{22}\,\pi}}{\left(\left(1-\sqrt{2}\right)^{12}+\left(1+\sqrt{2}\right)^{12}\right)^2}$$

$$\frac{4660}{384\,199\,201}+\frac{9\,557\,192\,e^{-2\sqrt{22}\,\pi}}{384\,199\,201}-\frac{104\,928\,e^{-\sqrt{22}\,\pi}}{384\,199\,201}-\frac{24\,e^{\sqrt{22}\,\pi}}{384\,199\,201}+\frac{e^{2\sqrt{22}\,\pi}}{768\,398\,402}$$

Series representations:

$$2\left(\frac{e^{\pi\sqrt{22}} - 24 + (4096+276)\,e^{-\pi\sqrt{22}}}{\left(1+\sqrt{2}\right)^{12}+\left(1-\sqrt{2}\right)^{12}}\right)^2 =$$

$$\left(2\left(-24 + 4372\exp\left(-\pi\exp\left(i\pi\left\lfloor\frac{\arg(22-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\,(22-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right) + \exp\left(\pi\exp\left(i\pi\left\lfloor\frac{\arg(22-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\,(22-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right)^2\right) \Bigg/$$

$$\left(\left(1-\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\,(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^{12} + \left(1+\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\,(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^{12}\right)^2$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$2\left(\frac{e^{\pi\sqrt{22}}-24+(4096+276)\,e^{-\pi\sqrt{22}}}{\left(1+\sqrt{2}\right)^{12}+\left(1-\sqrt{2}\right)^{12}}\right)^2=$$

$$\left(\exp\left(-2\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(22-z_0)^k z_0^{-k}}{k!}\right)\right.$$

$$\left(4372-24\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(22-z_0)^k z_0^{-k}}{k!}\right)+\right.$$

$$\left.\left.\exp\left(2\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(22-z_0)^k z_0^{-k}}{k!}\right)\right)^2\right)\Big/$$

$$\left(2\left(1+6\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^2+\right.\right.$$

$$\left.\sqrt{z_0}^{\,4}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^4\right)^2$$

$$\left(1+60\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^2+\right.$$

$$134\sqrt{z_0}^{\,4}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^4+$$

$$60\sqrt{z_0}^{\,6}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^6+$$

$$\left.\left.\sqrt{z_0}^{\,8}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8\right)^2\right)$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \le 0$))

$$2\left(\frac{e^{\pi\sqrt{22}} - 24 + (4096 + 276)\, e^{-\pi\sqrt{22}}}{\left(1+\sqrt{2}\right)^{12} + \left(1-\sqrt{2}\right)^{12}}\right)^2 =$$

$$\Bigg(2\Bigg(-24 + 4372 \exp\Bigg(-\pi\left(\frac{1}{z_0}\right)^{1/2\,\lfloor\arg(22-z_0)/(2\pi)\rfloor}$$

$$z_0^{1/2\,(1+\lfloor\arg(22-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty}\frac{(-1)^k \left(-\frac{1}{2}\right)_k (22-z_0)^k\, z_0^{-k}}{k!}\Bigg) +$$

$$\exp\Bigg(\pi\left(\frac{1}{z_0}\right)^{1/2\,\lfloor\arg(22-z_0)/(2\pi)\rfloor} z_0^{1/2\,(1+\lfloor\arg(22-z_0)/(2\pi)\rfloor)}$$

$$\sum_{k=0}^{\infty}\frac{(-1)^k \left(-\frac{1}{2}\right)_k (22-z_0)^k\, z_0^{-k}}{k!}\Bigg)\Bigg)\Bigg)^2\Bigg)\Big/$$

$$\Bigg(\Bigg(1-\left(\frac{1}{z_0}\right)^{1/2\,\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2\,(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}$$

$$\sum_{k=0}^{\infty}\frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}\Bigg)^{12} +$$

$$\Bigg(1+\left(\frac{1}{z_0}\right)^{1/2\,\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2\,(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}$$

$$\sum_{k=0}^{\infty}\frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}\Bigg)^{12}\Bigg)^2$$

From the previous expression, we obtain:

27*sqrt(((51.6565 1/ ((((integral_0^∞ 1/(1 + t^2) dt)^4) 1/(3 (3 + 64 (integral_0^∞ 1/(1 + t^2) dt)^2)))))))+1

Input interpretation:

$$27\sqrt{51.6565\times\frac{1}{\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^4\times\frac{1}{3\left(3+64\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^2\right)}}}+1$$

Result:

1729.

1729

This result is very near to the mass of candidate glueball **f_0(1710) scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Computation result:

$$27\sqrt{\frac{51.6565}{\frac{\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^4}{3\left(3+64\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2\right)}}}+1=1729.$$

[27*sqrt(((51.6565 1/ ((((integral_0^∞ 1/(1 + t^2) dt)^4) 1/(3 (3 + 64 (integral_0^∞ 1/(1 + t^2) dt)^2)))))))+1]^1/15

Input interpretation:

$$\sqrt[15]{27\sqrt{51.6565\times\frac{1}{\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^4\times\frac{1}{3\left(3+64\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2\right)}}}+1}$$

Result:

1.64382

$1.64382 \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 \ldots$

Computation result:

$$\sqrt[15]{27\sqrt{\frac{51.6565}{\frac{\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^4}{3\left(3+64\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2\right)}}}+1}=1.64382$$

For   ((((√(10-2√5) -2))/((√5-1)))) = 8πG;   G = 0.011303146014

[2Pi((((√(10-2√5) -2))/((√5-1))))]/(0.011303146014)

We obtain:

-1/2(((((1/(1+(3/([0.9323942*Pi(1/(((√(10-2√5) -2))/((√5-1))))]/(0.011303146014)))))) * ln[(((exp(([0.932394*2Pi(1/(((√(10-2√5) -2))/((√5-1))))]/(0.011303146014))/(-3)))))]))

Input interpretation:

$$-\frac{1}{2}\left(\frac{1}{1+\frac{3}{\frac{0.9323942\,\pi\left(\frac{1}{\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}}\right)}{0.011303146014}}}\log\left(\exp\left(-\frac{1}{3}\times\frac{0.932394\times 2\,\pi\left(\frac{1}{\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}}\right)}{0.011303146014}\right)\right)\right)$$

$\pi(x)$ is the number of primes less than or equal to x

$\log(x)$ is the natural logarithm

Result:

54.011044538223231183724579410213526837976184170461982512888542976…

54.01104453….

Alternative representations:

$$\frac{\log\left(\exp\left(\frac{0.932394\times 2\pi\left(\frac{1}{\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}}\right)}{0.0113031460140000\,(-3)}\right)\right)(-1)}{\left(1+\frac{3}{\frac{0.932394\,\pi\left(\frac{1}{\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}}\right)}{0.0113031460140000}}\right)2} = -\frac{\log_e\left(\exp\left(-\frac{0.621596\,\pi\left(\frac{1}{\frac{-2+\sqrt{10-2\sqrt{5}}}{-1+\sqrt{5}}}\right)}{0.0113031460140000}\right)\right)}{2\left(1+\frac{3}{\frac{0.932394\,\pi\left(\frac{1}{\frac{-2+\sqrt{10-2\sqrt{5}}}{-1+\sqrt{5}}}\right)}{0.0113031460140000}}\right)}$$

$$\frac{\log\left(\exp\left(\frac{0.932394\times 2\,\pi\left(\frac{1}{\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}}\right)}{0.0113031460140000\,(-3)}\right)\right)(-1)}{\left(1+\frac{3}{\frac{0.932394\,\pi\left(\frac{1}{\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}}\right)}{0.0113031460140000}}\right)2}=$$

$$-\frac{\log(a)\log_a\left(\exp\left(-\frac{0.621596\,\pi\left(\frac{1}{\frac{-2+\sqrt{10-2\sqrt{5}}}{-1+\sqrt{5}}}\right)}{0.0113031460140000}\right)\right)}{2\left(1+\frac{3}{\frac{0.932394\,\pi\left(\frac{1}{\frac{-2+\sqrt{10-2\sqrt{5}}}{-1+\sqrt{5}}}\right)}{0.0113031460140000}}\right)}$$

$$\frac{\log\left(\exp\left(\frac{0.932394\times 2\pi\left(\frac{1}{\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}}\right)}{0.0113031460140000\,(-3)}\right)\right)(-1)}{\left(1+\frac{3}{\frac{0.932394\,\pi\left(\frac{1}{\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}}\right)}{0.0113031460140000}}\right)2}=\frac{\log\left(\exp\left(\frac{0.932394\times 2\times\sum_{i=1}^{n}1}{0.0113031460140000\,(-3)}\right)\right)(-1)}{\left(1+\frac{3}{\frac{0.932394\times\sum_{i=1}^{n}1}{0.0113031460140000}}\right)2}$$

$$\text{for } p_n \le \frac{-1+\sqrt{5}}{-2+\sqrt{10-2\sqrt{5}}} < p_{1+n}$$

From which:

-89/(((1/2(((((1/(1+(3/([0.9323942*Pi(1/(((√(10-2√5) -2))⁄((√5-1))))]/(0.011303146014)))))) * ln[(((exp(([0.932394*2Pi(1/(((√(10-2√5) -2))⁄((√5-1))))]/(0.011303146014))/(-3)))))]))))))

Input interpretation:

$$-\frac{89}{\frac{1}{2}\left(\frac{1}{1+\frac{3}{\frac{0.9323942\,\pi\left(\frac{1}{\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}}\right)}{0.011303146014}}}\log\left(\exp\left(-\frac{1}{3}\times\frac{0.932394\times 2\pi\left(\frac{1}{\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}}\right)}{0.011303146014}\right)\right)\right)}$$

$\pi(x)$ is the number of primes less than or equal to x

$\log(x)$ is the natural logarithm

Result:

1.6478111238344100985968588587219640645841450776750536585184149066
...

1.64781112383…. ≈ $\zeta(2) = \frac{\pi^2}{6} = 1.644934 \ldots$

And:

-89/(((1/2(((((1/(1+(3/([0.9323942*Pi(1/(((√(10-2√5) -2))/((√5-1))))]/(0.011303146014)))))) * ln[(((exp(([0.932394*2Pi(1/(((√(10-2√5) -2))/((√5-1))))]/(0.011303146014))/(-2-(0.937))))))]))))))

Where 0.937 is the following Omega meson Regge slope value:

$\omega/\omega_3 \mid 5+3 \mid m_{u/d} = 240 - 345 \mid 0.937 - 1.000$

Input interpretation:

$$-\frac{89}{\frac{1}{2}\left(\frac{1}{1+\frac{3}{\frac{0.9323942\,\pi\left(\frac{1}{\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}}\right)}{0.011303146014}}}\log\left(\exp\left(\frac{\frac{0.932394\times 2\,\pi\left(\frac{1}{\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}}\right)}{0.011303146014}}{-2-0.937}\right)\right)\right)}$$

$\pi(x)$ is the number of primes less than or equal to x

$\log(x)$ is the natural logarithm

Result:

1.6132070902338874865263248226888028192278780310438775316895281936
...

1.61320709…. result that is a very good approximation to the value of the golden ratio 1.618033988749...

Alternative representations:

$$-\frac{89}{\frac{\log\left(\exp\left(\frac{0.932394\times 2\,\pi\left(\frac{1}{\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}}\right)}{0.0113031460140000\,(-2-0.937)}\right)\right)}{\left(1+\frac{3}{\frac{0.932394\,\pi\left(\frac{1}{\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}}\right)}{0.0113031460140000}}\right)2}}=-\frac{89}{\frac{\log_e\left(\exp\left(-\frac{1.86479\,\pi\left(\frac{1}{\frac{-2+\sqrt{10-2\sqrt{5}}}{-1+\sqrt{5}}}\right)}{2.937\times 0.0113031460140000}\right)\right)}{2\left(1+\frac{3}{\frac{0.932394\,\pi\left(\frac{1}{\frac{-2+\sqrt{10-2\sqrt{5}}}{-1+\sqrt{5}}}\right)}{0.0113031460140000}}\right)}}$$

$$-\frac{89}{\frac{\log\left(\exp\left(\frac{0.932394\times 2\,\pi\left(\frac{1}{\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}}\right)}{0.0113031460140000\,(-2-0.937)}\right)\right)}{\left(1+\frac{3}{\frac{0.932394\,\pi\left(\frac{1}{\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}}\right)}{0.0113031460140000}}\right)2}}=-\frac{89}{\frac{\log(a)\log_a\left(\exp\left(-\frac{1.86479\,\pi\left(\frac{1}{\frac{-2+\sqrt{10-2\sqrt{5}}}{-1+\sqrt{5}}}\right)}{2.937\times 0.0113031460140000}\right)\right)}{2\left(1+\frac{3}{\frac{0.932394\,\pi\left(\frac{1}{\frac{-2+\sqrt{10-2\sqrt{5}}}{-1+\sqrt{5}}}\right)}{0.0113031460140000}}\right)}}$$

$$-\frac{89}{\frac{\log\left(\exp\left(\frac{0.932394\times 2\,\pi\left(\frac{1}{\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}}\right)}{0.0113031460140000\,(-2-0.937)}\right)\right)}{\left(1+\frac{3}{\frac{0.932394\,\pi\left(\frac{1}{\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}}\right)}{0.0113031460140000}}\right)2}}=-\frac{89}{\frac{\log\left(\exp\left(\frac{0.932394\times 2\times\sum_{i=1}^{n}1}{0.0113031460140000\,(-2-0.937)}\right)\right)}{\left(1+\frac{3}{\frac{0.932394\times\sum_{i=1}^{n}1}{0.0113031460140000}}\right)2}}$$

$$\text{for } p_n \le \frac{-1+\sqrt{5}}{-2+\sqrt{10-2\sqrt{5}}} < p_{1+n}$$

Mathematical connections with some sectors of String Theory

From:

Modular equations and approximations to π - *Srinivasa Ramanujan*
Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

We have that:

Hence

$$\begin{aligned} 64g_{22}^{24} &= e^{\pi\sqrt{22}} - 24 + 276e^{-\pi\sqrt{22}} - \cdots, \\ 64g_{22}^{-24} &= 4096e^{-\pi\sqrt{22}} + \cdots, \end{aligned}$$

so that

$$64(g_{22}^{24} + g_{22}^{-24}) = e^{\pi\sqrt{22}} - 24 + 4372e^{-\pi\sqrt{22}} + \cdots = 64\{(1+\sqrt{2})^{12} + (1-\sqrt{2})^{12}\}.$$

Hence

$$e^{\pi\sqrt{22}} = 2508951.9982\ldots.$$

Again

$$G_{37} = (6+\sqrt{37})^{\frac{1}{4}},$$

$$\begin{aligned} 64G_{37}^{24} &= e^{\pi\sqrt{37}} + 24 + 276e^{-\pi\sqrt{37}} + \cdots, \\ 64G_{37}^{-24} &= 4096e^{-\pi\sqrt{37}} - \cdots, \end{aligned}$$

so that

$$64(G_{37}^{24} + G_{37}^{-24}) = e^{\pi\sqrt{37}} + 24 + 4372e^{-\pi\sqrt{37}} - \cdots = 64\{(6+\sqrt{37})^{6} + (6-\sqrt{37})^{6}\}.$$

Hence

$$e^{\pi\sqrt{37}} = 199148647.999978\ldots.$$

Similarly, from

$$g_{58} = \sqrt{\left(\frac{5+\sqrt{29}}{2}\right)},$$

we obtain

$$64(g_{58}^{24} + g_{58}^{-24}) = e^{\pi\sqrt{58}} - 24 + 4372e^{-\pi\sqrt{58}} + \cdots = 64\left\{\left(\frac{5+\sqrt{29}}{2}\right)^{12} + \left(\frac{5-\sqrt{29}}{2}\right)^{12}\right\}.$$

Hence

$$e^{\pi\sqrt{58}} = 24591257751.99999982\ldots.$$

From:

An Update on Brane Supersymmetry Breaking
J. Mourad and A. Sagnotti - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

From the following vacuum equations:

$$T\, e^{\gamma_E\, \phi} \;=\; -\, \frac{\beta_E^{(p)}\, h^2}{\gamma_E}\; e^{\,-\,2\,(8\,-\,p)\,C\,+\,2\,\beta_E^{(p)}\,\phi}$$

$$16\, k'\, e^{\,-\,2\,C} \;=\; \frac{h^2\left(p\,+\,1\,-\,\frac{2\,\beta_E^{(p)}}{\gamma_E}\right) e^{\,-\,2\,(8\,-\,p)\,C\,+\,2\,\beta_E^{(p)}\,\phi}}{(7\,-\,p)}$$

$$(A')^2 \;=\; k\,e^{\,-\,2\,A} \;+\; \frac{h^2}{16(p\,+\,1)}\left(7\,-\,p\,+\,\frac{2\,\beta_E^{(p)}}{\gamma_E}\right) e^{\,-\,2\,(8\,-\,p)\,C\,+\,2\,\beta_E^{(p)}\,\phi}$$

we have obtained, from the results almost equals of the equations, putting

$4096\, e^{-\pi\sqrt{18}}$ instead of

$$e^{\,-\,2\,(8\,-\,p)\,C\,+\,2\,\beta_E^{(p)}\,\phi}$$

a new possible mathematical connection between the two exponentials. Thence, also the values concerning p, C, β_E and ϕ correspond to the exponents of e (i.e. of exp). Thence we obtain for p = 5 and $\beta_E = 1/2$:

$$e^{-6C+\phi} = 4096e^{-\pi\sqrt{18}}$$

Therefore, with respect to the exponentials of the vacuum equations, the Ramanujan's exponential has a coefficient of 4096 which is equal to 642, while -6C+ϕ is equal to -$\pi\sqrt{18}$. From this it follows that it is possible to establish mathematically, the dilaton value.

For

exp((-Pi*sqrt(18)) we obtain:

Input:

$\exp\left(-\pi\sqrt{18}\right)$

Exact result:

$e^{-3\sqrt{2}\,\pi}$

Decimal approximation:

$1.6272016226072509292942156739117979541838581136954016\ldots \times 10^{-6}$

$1.6272016\ldots * 10^{-6}$

Property:

$e^{-3\sqrt{2}\,\pi}$ is a transcendental number

Series representations:

$$e^{-\pi\sqrt{18}} = e^{-\pi\sqrt{17}\sum_{k=0}^{\infty}17^{-k}\binom{1/2}{k}}$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now, we have the following calculations:

$$e^{-6C+\phi} = 4096e^{-\pi\sqrt{18}}$$

$$e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

from which:

$$\frac{1}{4096}e^{-6C+\phi} = 1.6272016\ldots * 10\text{^}{-6}$$

$$0.000244140625\, e^{-6C+\phi} = e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10\text{^}{-6}$$

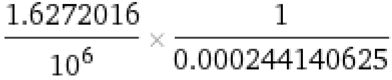
Now:

$$\ln\left(e^{-\pi\sqrt{18}}\right) = -13.328648814475 = -\pi\sqrt{18}$$

And:

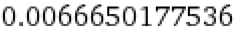
(1.6272016* 10^-6) *1/ (0.000244140625)

Input interpretation:



$$\frac{1.6272016}{10^6} \times \frac{1}{0.000244140625}$$

Result:



0.0066650177536

0.006665017...

Thence:

$$0.000244140625\, e^{-6C+\phi} = e^{-\pi\sqrt{18}}$$

Dividing both sides by 0.000244140625, we obtain:

$$\frac{0.000244140625}{0.000244140625}\, e^{-6C+\phi} = \frac{1}{0.000244140625}\, e^{-\pi\sqrt{18}}$$

$$e^{-6C+\phi} = 0.0066650177536$$

((((exp((-Pi*sqrt(18)))))))*1/0.000244140625

Input interpretation:

$$\exp\left(-\pi\sqrt{18}\right) \times \frac{1}{0.000244140625}$$

Result:

$$0.00666501785\ldots$$

0.00666501785…

Series representations:

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096 \exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty} 17^{-k}\binom{\frac{1}{2}}{k}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096 \exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k \left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096 \exp\left(-\frac{\pi \sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2}+j} 17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now:

$$e^{-6C+\phi} = 0.0066650177536$$

$$\exp\left(-\pi\sqrt{18}\right)\times\frac{1}{0.000244140625} =$$

$$e^{-\pi\sqrt{18}}\times\frac{1}{0.000244140625}$$

$$= 0.00666501785\ldots$$

From:

ln(0.00666501784619)

Input interpretation:

$$\log(0.00666501784619)$$

Result:

$$-5.010882647757\ldots$$

-5.010882647757…

Alternative representations:

$$\log(0.006665017846190000) = \log_e(0.006665017846190000)$$

$$\log(0.006665017846190000) = \log(a)\log_a(0.006665017846190000)$$

$$\log(0.006665017846190000) = -\text{Li}_1(0.993334982153810000)$$

Series representations:

$$\log(0.006665017846190000) = -\sum_{k=1}^{\infty}\frac{(-1)^k\,(-0.993334982153810000)^k}{k}$$

$$\log(0.006665017846190000) = 2 i \pi \left\lfloor \frac{\arg(0.006665017846190000 - x)}{2 \pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k (0.006665017846190000 - x)^k x^{-k}}{k} \quad \text{for } x < 0$$

$$\log(0.006665017846190000) = \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2 \pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2 \pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k (0.006665017846190000 - z_0)^k z_0^{-k}}{k}$$

Integral representation:

$$\log(0.006665017846190000) = \int_1^{0.006665017846190000} \frac{1}{t} \, dt$$

In conclusion:

$$-6C + \phi = -5.010882647757 \ldots$$

and for C = 1, we obtain:

$$\phi = -5.010882647757 + 6 = \mathbf{0.989117352243} = \boldsymbol{\phi}$$

Note that the values of n_s (spectral index) 0.965, of the average of the Omega mesons Regge slope 0.987428571 and of the dilaton 0.989117352243, are also connected to the following two Rogers-Ramanujan continued fractions:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi - 1)\sqrt{5}} - \varphi + 1} = 1 - \frac{e^{-\pi}}{1 + \frac{e^{-2\pi}}{1 + \frac{e^{-3\pi}}{1 + \frac{e^{-4\pi}}{1 + \ldots}}}} \approx 0.9568666373$$

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\dots}}}}\approx 0.9991104684$$

(http://www.bitman.name/math/article/102/109/)

The mean between the two results of the above Rogers-Ramanujan continued fractions is 0.97798855285, value very near to the ψ Regge slope 0.979:

Ψ	3	$m_c = 1500$	0.979	-0.09

Also performing the 512th root of the inverse value of the Pion meson rest mass 139.57, we obtain:

((1/(139.57)))^1/512

Input interpretation:

$$\sqrt[512]{\frac{1}{139.57}}$$

Result:

0.990400732708644027550973755713301415460732796178555551684...

0.99040073.... result very near to the dilaton value $\mathbf{0.989117352243 = \phi}$ and to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

From

AdS Vacua from Dilaton Tadpoles and Form Fluxes - *J. Mourad and A. Sagnotti* - arXiv:1612.08566v2 [hep-th] 22 Feb 2017 - March 27, 2018

We have:

$$\begin{aligned} e^{2C} &= \frac{2\,\xi\, e^{\frac{\phi}{2}}}{1\ \pm\ \sqrt{1\ -\ \frac{\xi T}{3}\, e^{2\phi}}} \\ \frac{h^2}{32} &= \frac{\xi^7\, e^{4\phi}}{\left(1\ \pm\ \sqrt{1\ -\ \frac{\xi T}{3}\, e^{2\phi}}\right)^7}\left[\frac{42}{\xi}\left(1\ \pm\ \sqrt{1\ -\ \frac{\xi\, T}{3}\, e^{2\phi}}\right)\ +\ 5\, T\, e^{2\phi}\right]\ . \end{aligned} \qquad (2.7)$$

For

$T = \frac{16}{\pi^2}$

$\xi = 1$

we obtain:

(2*e^(0.989117352243/2)) / (1+sqrt(((1-1/3*16/(Pi)^2*e^(2*0.989117352243)))))

Input interpretation:

$$\frac{2\,e^{0.989117352243/2}}{1+\sqrt{1-\frac{1}{3}\times\frac{16}{\pi^2}\,e^{2\times0.989117352243}}}$$

Result:

$0.83941881822\ldots -$
$1.4311851867\ldots\, i$

Polar coordinates:

$r = 1.65919106525$ (radius), $\theta = -59.607521917°$ (angle)

1.65919106525….. result very near to the 14th root of the following Ramanujan’s class invariant $Q = \left(G_{505}/G_{101/5}\right)^3 = 1164.2696$ i.e. 1.65578...

Series representations:

$$\frac{2\,e^{0.98911735224300000/2}}{1+\sqrt{1-\frac{16\,e^{2\times0.98911735224300000}}{3\,\pi^2}}} = \frac{2\,e^{0.49455867612150000}}{1+\sqrt{-\frac{16\,e^{1.97823470448600000}}{3\,\pi^2}}\,\sum_{k=0}^{\infty}\left(\frac{3}{16}\right)^k\left(-\frac{e^{1.97823470448600000}}{\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}}$$

$$\frac{2\,e^{0.98911735224300000/2}}{1+\sqrt{1-\frac{16\,e^{2\times0.98911735224300000}}{3\,\pi^2}}} = \frac{2\,e^{0.49455867612150000}}{1+\sqrt{-\frac{16\,e^{1.97823470448600000}}{3\,\pi^2}}\,\sum_{k=0}^{\infty}\frac{\left(-\frac{3}{16}\right)^k\left(-\frac{e^{1.97823470448600000}}{\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}}$$

$$\frac{2\,e^{0.98911735224300000/2}}{1+\sqrt{1-\frac{16\,e^{2\times0.98911735224300000}}{3\,\pi^2}}} = \frac{2\,e^{0.49455867612150000}}{1+\sqrt{z_0}\,\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1-\frac{16\,e^{1.97823470448600000}}{3\,\pi^2}-z_0\right)^k z_0^{-k}}{k!}}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \le 0$))

From

$$\frac{h^2}{32} = \frac{\xi^7 e^{4\phi}}{\left(1 \pm \sqrt{1 - \frac{\xi T}{3} e^{2\phi}}\right)^7} \left[\frac{42}{\xi}\left(1 \pm \sqrt{1 - \frac{\xi T}{3} e^{2\phi}}\right) + 5 T e^{2\phi}\right]$$

We obtain:

e^(4*0.989117352243) / (((1+sqrt(1-1/3*16/(Pi)^2*e^(2*0.989117352243)))))^7 [42(1+sqrt(1-1/3*16/(Pi)^2*e^(2*0.989117352243)))+5*16/(Pi)^2*e^(2*0.989117352243)]

Input interpretation:

$$\frac{e^{4\times 0.989117352243}}{\left(1+\sqrt{1-\frac{1}{3}\times\frac{16}{\pi^2}\,e^{2\times 0.989117352243}}\right)^7}\left(42\left(1+\sqrt{1-\frac{1}{3}\times\frac{16}{\pi^2}\,e^{2\times 0.989117352243}}\right)+5\times\frac{16}{\pi^2}\,e^{2\times 0.989117352243}\right)$$

Result:

50.84107889... −
20.34506335... i

Polar coordinates:

$r = 54.76072411$ (radius), $\theta = -21.80979492°$ (angle)

54.76072411…..

Series representations:

$$\left(\left(42\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)+\frac{5\times 16\,e^{2\times 0.9891173522430000}}{\pi^2}\right)e^{4\times 0.9891173522430000}\right)\Big/\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)^7=\left(2\left(40\,e^{5.934704113458000}+21\,e^{3.956469408972000}\,\pi^2+21\,e^{3.956469408972000}\,\pi^2\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\left(\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}\right)\right)\Big/\left(\pi^2\left(1+\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\left(\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}\right)^7\right)$$

$$\left(\left(42\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)+\frac{5\times 16\,e^{2\times 0.9891173522430000}}{\pi^2}\right)e^{4\times 0.9891173522430000}\right)\Big/\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)^7=\left(2\left(40\,e^{5.934704113458000}+21\,e^{3.956469408972000}\,\pi^2+21\,e^{3.956469408972000}\,\pi^2\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\frac{\left(-\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\Big/\left(\pi^2\left(1+\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\frac{\left(-\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^7\right)$$

$$\left(\left(42\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)+\frac{5\times 16\,e^{2\times 0.9891173522430000}}{\pi^2}\right)\right.$$

$$\left.e^{4\times 0.9891173522430000}\right)\Big/\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)^7 =$$

$$\left(2\left(40\,e^{5.934704113458000}+21\,e^{3.956469408972000}\,\pi^2+21\,e^{3.956469408972000}\right.\right.$$

$$\left.\left.\pi^2\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}-z_0\right)^k z_0^{-k}}{k!}\right)\right)\Big/$$

$$\left(\pi^2\left(1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}-z_0\right)^k z_0^{-k}}{k!}\right)^7\right)$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \le 0$))

From which:

e^(4*0.989117352243) / (((1+sqrt(1-1/3*16/(Pi)^2*e^(2*0.989117352243)))))^7 [42(1+sqrt(1-1/3*16/(Pi)^2*e^(2*0.989117352243)))+5*16/(Pi)^2*e^(2*0.989117352243)]*1/34

Input interpretation:

$$\frac{e^{4\times 0.989117352243}}{\left(1+\sqrt{1-\frac{1}{3}\times\frac{16}{\pi^2}\,e^{2\times 0.989117352243}}\right)^7}\left(42\left(1+\sqrt{1-\frac{1}{3}\times\frac{16}{\pi^2}\,e^{2\times 0.989117352243}}\right)+5\times\frac{16}{\pi^2}\,e^{2\times 0.989117352243}\right)\times\frac{1}{34}$$

Result:

1.495325850… −
0.5983842161… i

Polar coordinates:

$r = 1.610609533$ (radius), $\theta = -21.80979492°$ (angle)

1.610609533…. result that is a good approximation to the value of the golden ratio 1.618033988749...

Series representations:

$$\left(\left(42\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)+\frac{5\times 16\,e^{2\times 0.9891173522430000}}{\pi^2}\right)e^{4\times 0.9891173522430000}\right)\Big/\left(34\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)^7\right)=$$

$$\left(40\,e^{5.934704113458000}+21\,e^{3.956469408972000}\,\pi^2+21\,e^{3.956469408972000}\,\pi^2\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\left(\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}\right)\Big/$$

$$\left(17\,\pi^2\left(1+\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\left(\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}\right)^7\right)$$

$$\left(\left(42\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)+\frac{5\times 16\,e^{2\times 0.9891173522430000}}{\pi^2}\right)e^{4\times 0.9891173522430000}\right)\Big/\left(34\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)^7\right)=$$

$$\left(40\,e^{5.934704113458000}+21\,e^{3.956469408972000}\,\pi^2+21\,e^{3.956469408972000}\,\pi^2\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\frac{\left(-\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\Big/$$

$$\left(17\,\pi^2\left(1+\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\frac{\left(-\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^7\right)$$

$$\left(\left(42\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)+\frac{5\times 16\,e^{2\times 0.9891173522430000}}{\pi^2}\right)e^{4\times 0.9891173522430000}\right)\Big/\left(34\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)^7\right)=$$

$$\left(40\,e^{5.934704113458000}+21\,e^{3.956469408972000}\,\pi^2+21\,e^{3.956469408972000}\,\pi^2\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}-z_0\right)^k z_0^{-k}}{k!}\right)\Big/\left(17\,\pi^2\left(1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}-z_0\right)^k z_0^{-k}}{k!}\right)^7\right)$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

Now, we have:

$$e^{2C} = \frac{2\,\xi\,e^{-\frac{\phi}{2}}}{1+\sqrt{1+\frac{\xi\Lambda}{3}\,e^{2\phi}}}\,, \tag{2.9}$$

$$\frac{h^2}{32} = \frac{e^{-4\phi}}{\left[1+\sqrt{1+\frac{\Lambda}{3}\,e^{2\phi}}\right]^7}\left[42\left(1+\sqrt{1+\frac{\Lambda}{3}\,e^{2\phi}}\right)-13\,\Lambda\,e^{2\phi}\right]. \tag{2.10}$$

For:

$\xi = 1$

$\Lambda \simeq \frac{4\pi^2}{25}$

$\phi = 0.989117352243$

From

$$e^{2C} = \frac{2\xi e^{-\frac{\phi}{2}}}{1 + \sqrt{1 + \frac{\xi\Lambda}{3} e^{2\phi}}} ,$$

we obtain:

((2*e^(-0.989117352243/2)) / ((((1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243)))))))

Input interpretation:

$$\frac{2 e^{-0.989117352243/2}}{1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}}$$

Result:

0.382082347529...

0.382082347529….

Series representations:

$$\frac{2 e^{-0.98911735224300000/2}}{1+\sqrt{1+\frac{\left(4\pi^2\right)e^{2\times 0.98911735224300000}}{3\times 25}}} = 2 \Bigg/ \left(e^{0.494558676121500000} \left(1+\sqrt{\frac{4 e^{1.978234704486000}\pi^2}{75}} \sum_{k=0}^{\infty} \left(\frac{75}{4}\right)^k \left(e^{1.978234704486000}\pi^2\right)^{-k} \binom{\frac{1}{2}}{k}\right)\right)$$

$$\frac{2 e^{-0.98911735224300000/2}}{1+\sqrt{1+\frac{\left(4\pi^2\right)e^{2\times 0.98911735224300000}}{3\times 25}}} = 2 \Bigg/ \left(e^{0.494558676121500000} \left(1+\sqrt{\frac{4 e^{1.978234704486000}\pi^2}{75}} \sum_{k=0}^{\infty} \frac{\left(-\frac{75}{4}\right)^k \left(e^{1.978234704486000}\pi^2\right)^{-k} \left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$\frac{2\,e^{-0.98911735224300000/2}}{1+\sqrt{1+\frac{(4\,\pi^2)\,e^{2\times 0.98911735224300000}}{3\times 25}}} = \frac{2}{e^{0.4945586761215000}\left(1+\sqrt{z_0}\,\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)}$$

$$\text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$$

From which:

1+1/(((4((2*e^(-0.989117352243/2))) / ((((1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))))))))

Input interpretation:

$$1+\frac{1}{4\times\frac{2\,e^{-0.989117352243/2}}{1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\,\pi^2\right)\right)e^{2\times 0.989117352243}}}}$$

Result:

1.65430921270...

1.6543092….. We note that, the result 1.6543092... is very near to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3 = 1164.2696$ i.e. 1.65578...

Indeed:

$$G_{505} = P^{-1/4}Q^{1/6} = (\sqrt{5}+2)^{1/2}\left(\frac{\sqrt{5}+1}{2}\right)^{1/4}(\sqrt{101}+10)^{1/4}$$

$$\times\left((130\sqrt{5}+29\sqrt{101})+\sqrt{169440+7540\sqrt{505}}\right)^{1/6}.$$

Thus, it remains to show that

$$(130\sqrt{5}+29\sqrt{101})+\sqrt{169440+7540\sqrt{505}} = \left(\sqrt{\frac{113+5\sqrt{505}}{8}}+\sqrt{\frac{105+5\sqrt{505}}{8}}\right)^3,$$

which is straightforward. □

$$\sqrt[14]{\left(\sqrt{\frac{113+5\sqrt{505}}{8}}+\sqrt{\frac{105+5\sqrt{505}}{8}}\right)^3} = 1{,}65578\ldots$$

Series representations:

$$1+\frac{1}{\dfrac{4\left(2\,e^{-0.98911735224300000/2}\right)}{1+\sqrt{1+\dfrac{(4\,\pi^2)\,e^{2\times 0.98911735224300000}}{3\times 25}}}} =$$

$$1+\frac{e^{0.49455867612150000}}{8}+\frac{1}{8}\,e^{0.49455867612150000}\sqrt{\frac{4\,e^{1.97823470448600000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.97823470448600000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}$$

$$1+\frac{1}{\dfrac{4\left(2\,e^{-0.98911735224300000/2}\right)}{1+\sqrt{1+\dfrac{(4\,\pi^2)\,e^{2\times 0.98911735224300000}}{3\times 25}}}} =$$

$$1+\frac{e^{0.49455867612150000}}{8}+\frac{1}{8}\,e^{0.49455867612150000}\sqrt{\frac{4\,e^{1.97823470448600000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.97823470448600000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

$$1+\frac{1}{\frac{4\left(2\,e^{-0.98911735224300000/2}\right)}{1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.98911735224300000}}{3\times 25}}}}=1+\frac{e^{0.49455867612150000}}{8}+$$

$$\frac{1}{8}\,e^{0.49455867612150000}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.97823470448600000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}$$

$$\text{for }(\text{not }(z_0\in\mathbb{R}\text{ and }-\infty<z_0\leq 0))$$

And from

$$\frac{h^2}{32}=\frac{e^{-4\phi}}{\left[1+\sqrt{1+\frac{\Lambda}{3}e^{2\phi}}\right]^7}\left[42\left(1+\sqrt{1+\frac{\Lambda}{3}e^{2\phi}}\right)-13\Lambda e^{2\phi}\right].$$

we obtain:

e^(-4*0.989117352243) / [1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243)))]^7 * [42(1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243)))-13*(4Pi^2)/25*e^(2*0.989117352243)]

Input interpretation:

$$\frac{e^{-4\times 0.989117352243}}{\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}(4\pi^2)\right)e^{2\times 0.989117352243}}\right)^7}\left(42\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}(4\pi^2)\right)e^{2\times 0.989117352243}}\right)-13\left(\frac{1}{25}(4\pi^2)\right)e^{2\times 0.989117352243}\right)$$

Result:

−0.034547055658…

-0.034547055658…

Series representations:

$$\left(\left(42\left(1+\sqrt{1+\frac{\left(4\,\pi^2\right)e^{2\times0.9891173522430000}}{3\times25}}-\frac{1}{25}\left(4\,\pi^2\right)13\,e^{2\times0.9891173522430000}\right)\right)e^{-4\times0.9891173522430000}\right)\Big/\left(1+\sqrt{1+\frac{\left(4\,\pi^2\right)e^{2\times0.9891173522430000}}{3\times25}}\right)^7=$$

$$-\left(\left(42\left(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\,\pi^2-25\,e^{1.978234704486000}\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)\right)\Big/\left(25\,e^{5.934704113458000}\left(1+\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)^7\right)\right)$$

$$\left(\left(42\left(1+\sqrt{1+\frac{\left(4\,\pi^2\right)e^{2\times0.9891173522430000}}{3\times25}}-\frac{1}{25}\left(4\,\pi^2\right)13\,e^{2\times0.9891173522430000}\right)\right)e^{-4\times0.9891173522430000}\right)\Big/\left(1+\sqrt{1+\frac{\left(4\,\pi^2\right)e^{2\times0.9891173522430000}}{3\times25}}\right)^7=$$

$$-\left(\left(42\left(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\,\pi^2-25\,e^{1.978234704486000}\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\Big/\left(25\,e^{5.934704113458000}\left(1+\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^7\right)\right)$$

$$\left(\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}(4\pi^2)\,13\,e^{2\times 0.9891173522430000}\right)\right)e^{-4\times 0.9891173522430000}\right)\Big/\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7=$$

$$-\left(\left(42\left(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\,\pi^2-25\,e^{1.978234704486000}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)\right)\Big/\left(25\,e^{5.934704113458000}\left(1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)^7\right)\right)$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

From which:

47 *1/(((-1/(((((e^(-4*0.989117352243) / [1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))]^7 * [42(1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))-13*(4Pi^2)/25*e^(2*0.989117352243))]))))))))

Input interpretation:

$$47\left(-\left(1\Big/1\Big/\left(\frac{e^{-4\times 0.989117352243}}{\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}(4\pi^2)\right)e^{2\times 0.989117352243}}\right)^7}\left(42\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}(4\pi^2)\right)e^{2\times 0.989117352243}}-13\left(\frac{1}{25}(4\pi^2)\right)e^{2\times 0.989117352243}\right)\right)\right)\right)\right)$$

Result:

1.6237116159...

1.6237116159…. result that is an approximation to the value of the golden ratio 1.618033988749...

Series representations:

$$-\left(47/1/\left(e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}(4\pi^2)\,13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)=$$

$$\left(1974\left(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\,\pi^2-25\,e^{1.978234704486000}\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)\right)\Big/\left(25\,e^{5.934704113458000}\left(1+\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)^7\right)$$

$$-\Bigg(47 \Big/ 1 \Big/ \Bigg(e^{-4\times 0.9891173522430000}\Bigg(42\Bigg(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}} - \frac{1}{25}(4\pi^2)\,13\,e^{2\times 0.9891173522430000}\Bigg)\Bigg)\Bigg)\Bigg) \Big/ \Bigg(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\Bigg)^7\Bigg)\Bigg) =$$

$$\Bigg(1974\Bigg(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\,\pi^2 - 25\,e^{1.978234704486000}\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\Bigg)\Bigg)\Big/\Bigg(25\,e^{5.934704113458000}\Bigg(1+\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\Bigg)^7\Bigg)$$

$$-\Bigg(47 \Big/ 1 \Big/ \Bigg(e^{-4\times 0.9891173522430000}\Bigg(42\Bigg(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}} - \frac{1}{25}(4\pi^2)\,13\,e^{2\times 0.9891173522430000}\Bigg)\Bigg)\Bigg)\Bigg) \Big/ \Bigg(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\Bigg)^7\Bigg)\Bigg) =$$

$$\Bigg(1974\Bigg(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\,\pi^2 - 25\,e^{1.978234704486000}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\Bigg)\Bigg)\Big/\Bigg(25\,e^{5.934704113458000}\Bigg(1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\Bigg)^7\Bigg)$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

And again:

32((((e^(-4*0.989117352243) / [1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))]^7 * [42(1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))-13*(4Pi^2)/25*e^(2*0.989117352243))]))))

Input interpretation:

$$32\left(\frac{e^{-4\times 0.989117352243}}{\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}\right)^7}\left(42\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}-13\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}\right)\right)\right)$$

Result:

−1.1055057810...

-1.1055057810….

We note that the result -1.1055057810…. is very near to the value of Cosmological Constant, less 10^{-52} , thence 1.1056, with minus sign

Series representations:

$$\left(32\, e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{\left(4\pi^2\right) e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}\left(4\pi^2\right) 13\, e^{2\times 0.9891173522430000}\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{\left(4\pi^2\right) e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7 =$$

$$-\left(\left(1344\left(-25\, e^{1.978234704486000}+52\, e^{3.956469408972000}\,\pi^2-25\, e^{1.978234704486000}\sqrt{\frac{4\, e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)\right)\Big/\left(25\, e^{5.934704113458000}\left(1+\sqrt{\frac{4\, e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)^7\right)\right)$$

$$\left(32\, e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\,\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}\,(4\,\pi^2)\,13\, e^{2\times 0.9891173522430000}\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\,\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7 = -\left(\left(1344\left(-25\, e^{1.978234704486000}+52\, e^{3.956469408972000}\,\pi^2-25\, e^{1.978234704486000}\sqrt{\frac{4\, e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\Big/\left(25\, e^{5.934704113458000}\left(1+\sqrt{\frac{4\, e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^7\right)\right)$$

$$\left(32\, e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\,\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}\,(4\,\pi^2)\,13\, e^{2\times 0.9891173522430000}\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\,\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7 = -\left(\left(1344\left(-25\, e^{1.978234704486000}+52\, e^{3.956469408972000}\,\pi^2-25\, e^{1.978234704486000}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\, e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)\right)\Big/\left(25\, e^{5.934704113458000}\left(1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\, e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)^7\right)\right)$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

And:

-[32((((e^(-4*0.989117352243) / [1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))]^7 * [42(1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))-13*(4Pi^2)/25*e^(2*0.989117352243))]))))]^5

Input interpretation:

$$-\left(32\left(\frac{e^{-4\times 0.989117352243}}{\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^{2}\right)\right)e^{2\times 0.989117352243}}\right)^{7}}\left(42\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^{2}\right)\right)e^{2\times 0.989117352243}}-13\left(\frac{1}{25}\left(4\pi^{2}\right)\right)e^{2\times 0.989117352243}\right)\right)\right)^{5}\right)$$

Result:

1.651220569...

1.651220569…. result very near to the 14th root of the following Ramanujan's class invariant $Q=\left(G_{505}/G_{101/5}\right)^{3}$ = 1164.2696 i.e. 1.65578...

Series representations:

$$-\left(\left(32\, e^{-4\times 0.9891173522430000} \left(42 \left(1+\sqrt{1+\frac{(4\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}} - \frac{1}{25}\left(4\pi^2\right) 13\, e^{2\times 0.9891173522430000}\right)\right)\right) \Big/ \left(1+\sqrt{1+\frac{(4\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)^5 =$$

$$\left(4\,385\,270\,057\,140\,224 \left(-25+52\, e^{1.978234704486000}\, \pi^2 - 25\sqrt{\frac{4\, e^{1.978234704486000}\, \pi^2}{75}} \sum_{k=0}^{\infty} \left(\frac{75}{4}\right)^k \left(e^{1.978234704486000}\, \pi^2\right)^{-k} \binom{\frac{1}{2}}{k}\right)^5\right) \Big/ \left(9\,765\,625\, e^{19.78234704486000} \left(1+\sqrt{\frac{4\, e^{1.978234704486000}\, \pi^2}{75}} \sum_{k=0}^{\infty} \left(\frac{75}{4}\right)^k \left(e^{1.978234704486000}\, \pi^2\right)^{-k} \binom{\frac{1}{2}}{k}\right)^{35}\right)$$

$$-\left(\left(32\, e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}(4\pi^2)\, 13\, e^{2\times 0.9891173522430000}\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)^5 =$$

$$\left(4\,385\,270\,057\,140\,224\left(-25+52\, e^{1.978234704486000}\,\pi^2-25\sqrt{\frac{4\, e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^5\right)\Big/\left(9\,765\,625\, e^{19.78234704486000}\left(1+\sqrt{\frac{4\, e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^{35}\right)$$

$$-\left(\left(32\, e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}(4\pi^2)\, 13\, e^{2\times 0.9891173522430000}\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)^5 =$$

$$\left(4\,385\,270\,057\,140\,224\left(-25+52\, e^{1.978234704486000}\,\pi^2-25\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\, e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)^5\right)\Big/\left(9\,765\,625\, e^{19.78234704486000}\left(1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\, e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)^{35}\right)$$

for (not $(z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0)$)

We obtain also:

-[32((((e^(-4*0.989117352243) / [1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))]^7 * [42(1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))-13*(4Pi^2)/25*e^(2*0.989117352243))])))]^1/2

Input interpretation:

$$-\sqrt{\left(32\left(\frac{e^{-4\times0.989117352243}}{\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times0.989117352243}}\right)^7}\left(42\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times0.989117352243}}\right)-13\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times0.989117352243}\right)\right)\right)}$$

Result:

-0
$1.0514303501\ldots\, i$

Polar coordinates:

$r = 1.05143035007$ (radius), $\theta = -90°$ (angle)

1.05143035007

Series representations:

$$-\sqrt{\left(\left(32\,e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\,\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}\,(4\,\pi^2)\,13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\,\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)}=-\frac{8}{5}\sqrt{21}\,\sqrt{\left(\left(25-52\,e^{1.978234704486000}\,\pi^2+25\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\,\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)\Big/\left(e^{3.956469408972000}\left(1+\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\,\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)^7\right)\right)}$$

$$-\sqrt{\left(\left(32\, e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}(4\pi^2)\, 13\, e^{2\times 0.9891173522430000}\right)\right)\right)\Big/\left(\left(1+\sqrt{1+\frac{(4\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)\right)}=-\frac{8}{5}\sqrt{21}\sqrt{\left(\left(25-52\, e^{1.978234704486000}\,\pi^2+25\sqrt{\frac{4\, e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\Big/\left(e^{3.956469408972000}\left(1+\sqrt{\frac{4\, e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^7\right)\right)}$$

$$-\sqrt{\left(\left(32\, e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}(4\pi^2)\, 13\, e^{2\times 0.9891173522430000}\right)\right)\right)\Big/\left(\left(1+\sqrt{1+\frac{(4\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)\right)}=-\frac{8}{5}\sqrt{21}\sqrt{\left(\left(25-52\, e^{1.978234704486000}\,\pi^2+25\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\, e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)\Big/\left(e^{3.956469408972000}\left(1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\, e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)^7\right)\right)}$$

for (not $(z_0\in\mathbb{R}$ and $-\infty<z_0\leq 0)$)

1 / -[32((((e^(-4*0.989117352243) / [1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))]^7 * [42(1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))-13*(4Pi^2)/25*e^(2*0.989117352243))])))))]^1/2

Input interpretation:

$$-\left(1\Big/\left(\sqrt{32\left(\frac{e^{-4\times 0.989117352243}}{\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}\right)^7}\left(42\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}\right)-13\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}\right)\right)}\right)\right)$$

Result:

$0.95108534763\ldots\, i$

Polar coordinates:

$r = 0.95108534763$ (radius), $\theta = 90°$ (angle)

0.95108534763

We know that the primordial fluctuations are consistent with Gaussian purely adiabatic scalar perturbations characterized by a power spectrum with a spectral index $n_s = 0.965 \pm 0.004$, consistent with the predictions of slow-roll, single-field, inflation.

Thence 0.95108534763 is a result very near to the spectral index n_s, to the mesonic Regge slope, to the inflaton value at the end of the inflation 0.9402 and to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}}-\varphi+1}=1-\cfrac{e^{-\pi}}{1+\cfrac{e^{-2\pi}}{1+\cfrac{e^{-3\pi}}{1+\cfrac{e^{-4\pi}}{1+\ldots}}}}\approx 0.9568666373$$

Series representations:

$$-\left(1\Big/\left(\sqrt{\left(\left(32\,e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}(4\pi^2)\,13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)}\right)\right)=$$

$$-\left(5\Big/\left(8\sqrt{21}\sqrt{\left(\left(25-52\,e^{1.978234704486000}\,\pi^2+25\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)\Big/\left(e^{3.956469408972000}\left(1+\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)^7\right)\right)}\right)\right)$$

$$-\left(1\Big/\left(\sqrt{\left(\left(\left(32\,e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\,\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}\,(4\,\pi^2)\,13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\,\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)\right)}\right)\right)=$$

$$-\left(5\Big/\left(8\,\sqrt{21}\,\sqrt{\left(\left(\left(25-52\,e^{1.978234704486000}\,\pi^2+25\,\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\,\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k\,!}\right)\Big/\left(e^{3.956469408972000}\left(1+\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\,\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k\,!}\right)^7\right)\right)\right)}\right)\right)$$

$$-\Bigg(1\Bigg/\Bigg(\sqrt{\Bigg(\Bigg(32\, e^{-4\times0.9891173522430000}\Bigg(42\Bigg(1+\sqrt{1+\frac{(4\,\pi^2)\,e^{2\times0.9891173522430000}}{3\times25}}-\frac{1}{25}}$$

$$(4\,\pi^2)\,13\,e^{2\times0.9891173522430000}\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\left(1+\sqrt{1+\frac{(4\,\pi^2)\,e^{2\times0.9891173522430000}}{3\times25}}\right)^7\Bigg)\Bigg)\Bigg)=$$

$$-\Bigg(5\Bigg/\Bigg(8\sqrt{21}\ \sqrt{\Bigg(\Bigg(25-52\,e^{1.978234704486000}\,\pi^2+25\sqrt{z_0}}$$

$$\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\Bigg)\Bigg/$$

$$\Bigg(e^{3.956469408972000}$$

$$\Bigg(1+\sqrt{z_0}\sum_{k=0}^{\infty}$$

$$\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\Bigg)^7\Bigg)\Bigg)\Bigg)\Bigg)\Bigg)$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \le 0$))

From the previous expression

$$\frac{e^{-4\times0.989117352243}}{\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}(4\,\pi^2)\right)e^{2\times0.989117352243}}\right)^7 \left(42\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}(4\,\pi^2)\right)e^{2\times0.989117352243}}-13\left(\frac{1}{25}(4\,\pi^2)\right)e^{2\times0.989117352243}\right)\right)}$$

= -0.034547055658…

we have also:

1+1/(((4((2*e^(-0.989117352243/2))) / ((((1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243)))))))))) + (-0.034547055658)

Input interpretation:

$$1+\frac{1}{4\times\frac{2\,e^{-0.989117352243/2}}{1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\,\pi^2\right)\right)e^{2\times 0.989117352243}}}}-0.034547055658$$

Result:

1.61976215705...

1.61976215705….. result that is a very good approximation to the value of the golden ratio 1.618033988749...

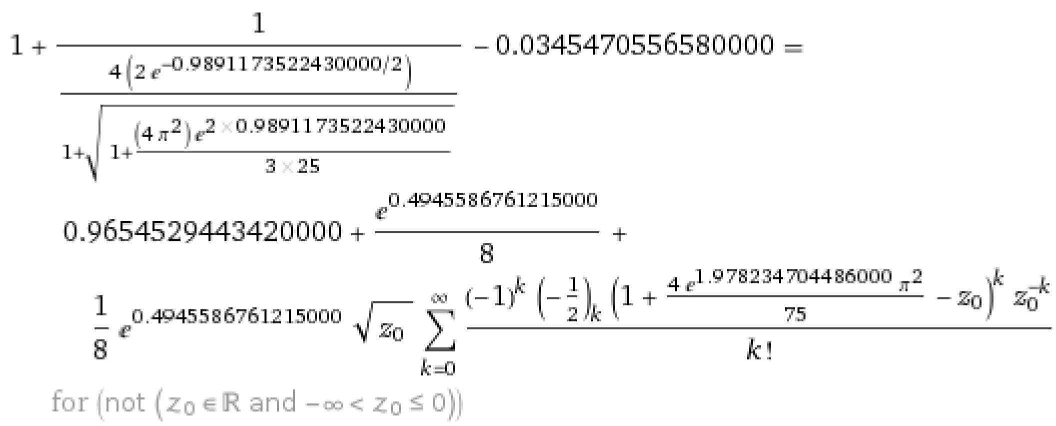
Series representations:

$$1+\frac{1}{\frac{4\left(2\,e^{-0.98911735224330000/2}\right)}{1+\sqrt{1+\frac{\left(4\,\pi^2\right)e^{2\times 0.98911735224330000}}{3\times 25}}}}-0.03454705565580000=$$

$$0.9654529443420000+\frac{e^{0.4945586761215000}}{8}+\frac{1}{8}\,e^{0.4945586761215000}\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}$$

$$1+\frac{1}{\frac{4\left(2\,e^{-0.98911735224330000/2}\right)}{1+\sqrt{1+\frac{\left(4\,\pi^2\right)e^{2\times 0.98911735224330000}}{3\times 25}}}}-0.03454705565580000=$$

$$0.9654529443420000+\frac{e^{0.4945586761215000}}{8}+\frac{1}{8}\,e^{0.4945586761215000}\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$



$$1+\frac{1}{\frac{4\left(2\,e^{-0.98911735224300000/2}\right)}{1+\sqrt{1+\frac{(4\,\pi^2)\,e^{2\times 0.98911735224300000}}{3\times 25}}}}-0.0345470556580000=$$

$$0.9654529443420000+\frac{e^{0.4945586761215000}}{8}+\frac{1}{8}\,e^{0.4945586761215000}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}$$

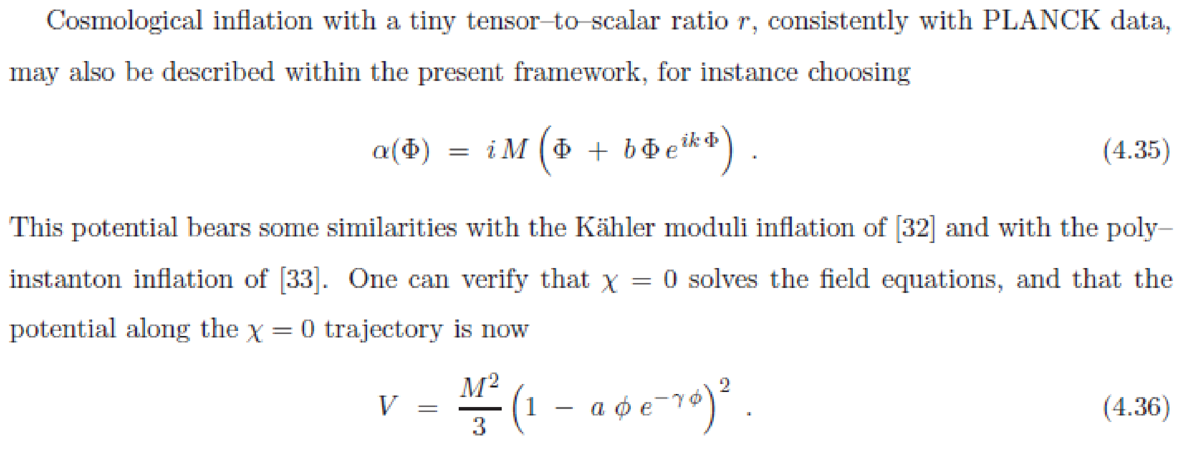
for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

From

Properties of Nilpotent Supergravity

E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

We have that:



Cosmological inflation with a tiny tensor–to–scalar ratio r, consistently with PLANCK data, may also be described within the present framework, for instance choosing

$$\alpha(\Phi) \;=\; i\,M\left(\Phi \;+\; b\,\Phi\,e^{ik\,\Phi}\right)\;. \tag{4.35}$$

This potential bears some similarities with the Kähler moduli inflation of [32] and with the poly–instanton inflation of [33]. One can verify that $\chi = 0$ solves the field equations, and that the potential along the $\chi = 0$ trajectory is now

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\;. \tag{4.36}$$

We analyzing the following equation:

$$V = \frac{M^2}{3}\left(1 - a\,\phi\, e^{-\gamma\phi}\right)^2 .$$

$$\phi = \varphi - \frac{\sqrt{6}}{k} ,$$

$$a = \frac{b\gamma}{e} < 0 , \qquad \gamma = \frac{k}{\sqrt{6}} < 0 .$$

We have:

(M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

i.e.

V = (M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

For k = 2 and φ = 0.9991104684, that is the value of the scalar field that is equal to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\dfrac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1} = 1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+\dots}}}} \approx 0.9991104684$$

we obtain:

V = (M^2)/3*[1-(b/euler number * 2/sqrt6) * (0.9991104684- sqrt6/2) * exp(-(2/sqrt6)(0.9991104684- sqrt6/2))]^2

Input interpretation:

$$V = \frac{M^2}{3}\left(1-\left(\frac{b}{e}\times\frac{2}{\sqrt{6}}\right)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2}{\sqrt{6}}\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\right)\right)^2$$

Result:

$$V = \frac{1}{3}\,(0.0814845\,b+1)^2\,M^2$$

Solutions:

$$b = \frac{225.913\left(-0.054323\,M^2 \pm 6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2} \quad (M \neq 0)$$

Alternate forms:

$$V = 0.00221324\,(b+12.2723)^2\,M^2$$

$$V = 0.00221324\left(b^2\,M^2 + 24.5445\,b\,M^2 + 150.609\,M^2\right)$$

$$-0.00221324\,b^2\,M^2 - 0.054323\,b\,M^2 - \frac{M^2}{3} + V = 0$$

Expanded form:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + \frac{M^2}{3}$$

Alternate form assuming b, M, and V are positive:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

Alternate form assuming b, M, and V are real:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + 0.333333\,M^2 + 0$$

Derivative:

$$\frac{\partial}{\partial b}\left(\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right) = 0.054323\,(0.0814845\,b + 1)\,M^2$$

Implicit derivatives:

$$\frac{\partial b(M, V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}$$

$$\frac{\partial b(M, V)}{\partial M} = -\frac{\frac{226\,802\,245}{18\,480\,874} + b}{M}$$

$$\frac{\partial M(b, V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}$$

$$\frac{\partial M(b, V)}{\partial b} = -\frac{18\,480\,874\,M}{226\,802\,245 + 18\,480\,874\,b}$$

$$\frac{\partial V(b,\, M)}{\partial M} = \frac{2\,(226\,802\,245 + 18\,480\,874\, b)^2\, M}{154\,317\,775\,011\,120\,075}$$

$$\frac{\partial V(b,\, M)}{\partial b} = \frac{36\,961\,748\,(226\,802\,245 + 18\,480\,874\, b)\, M^2}{154\,317\,775\,011\,120\,075}$$

Global minimum:

$$\min\left\{\frac{1}{3}\,(0.0814845\, b + 1)^2\, M^2\right\} = 0 \text{ at } (b,\, M) = (-16,\, 0)$$

Global minima:

$$\min\left\{\frac{1}{3}\, M^2 \left(1 - \frac{(b\ 2)\left(0.9991104684 - \frac{\sqrt{6}}{2}\right) \exp\left(-\frac{2\left(0.9991104684 - \frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\} = 0$$

$$\text{for } b = -\frac{226\,802\,245}{18\,480\,874}$$

$$\min\left\{\frac{1}{3}\, M^2 \left(1 - \frac{(b\ 2)\left(0.9991104684 - \frac{\sqrt{6}}{2}\right) \exp\left(-\frac{2\left(0.9991104684 - \frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\} = 0$$

$$\text{for } M = 0$$

From:

$$b = \frac{225.913\left(-0.054323\, M^2 \pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2} \quad (M \neq 0)$$

we obtain

(225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2

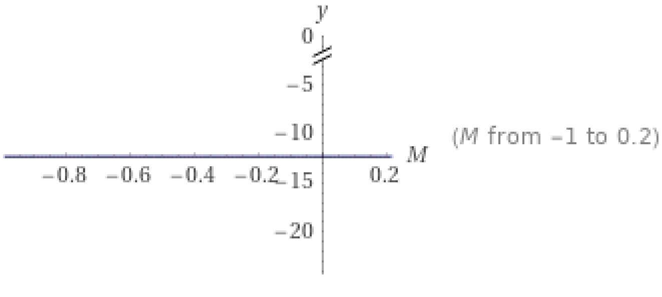
Input interpretation:

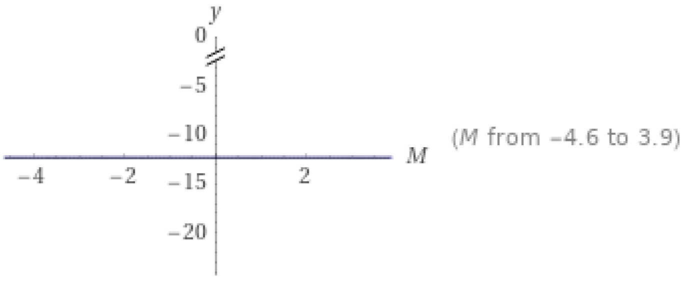
$$\frac{225.913\left(-0.054323\, M^2 + 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}$$

Result:

$$\frac{225.913\left(6.58545\times 10^{-10}\sqrt{M^4} - 0.054323\, M^2\right)}{M^2}$$

Plots:





Alternate form assuming M is real:

$$-12.2723$$

-12.2723 result very near to the black hole entropy value 12.1904 = ln(196884)

Alternate forms:

$$-\frac{12.2723\left(M^2-1.21228\times10^{-8}\sqrt{M^4}\right)}{M^2}$$

$$\frac{1.48774\times10^{-7}\sqrt{M^4}-12.2723\,M^2}{M^2}$$

Expanded form:

$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723$$

Property as a function:

Parity

even

Series expansion at M = 0:

$$\left(\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723\right)+O\left(M^6\right)$$

(generalized Puiseux series)

Series expansion at M = ∞:

$$-12.2723$$

Derivative:

$$\frac{d}{dM}\left(\frac{225.913\left(6.58545\times 10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right)=\frac{3.55271\times 10^{-15}}{M}$$

Indefinite integral:

$$\int \frac{225.913\left(-0.054323\,M^2+6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}\,dM=$$
$$\frac{1.48774\times 10^{-7}\sqrt{M^4}}{M}-12.2723\,M+\text{constant}$$

Global maximum:

$$\max\left\{\frac{225.913\left(6.58545\times 10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\text{ at }M=-1$$

Global minimum:

$$\min\left\{\frac{225.913\left(6.58545\times 10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\text{ at }M=-1$$

Limit:

$$\lim_{M\to\pm\infty} \frac{225.913\left(-0.054323\, M^2 + 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2} = -12.2723$$

Definite integral after subtraction of diverging parts:

$$\int_0^\infty \left(\frac{225.913\left(-0.054323\, M^2 + 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2} - -12.2723\right) dM = 0$$

From b that is equal to

$$\frac{225.913\left(-0.054323\, M^2 + 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}$$

from:

Result:

$$V = \frac{1}{3}\,(0.0814845\, b + 1)^2\, M^2$$

we obtain:

1/3 (0.0814845 ((225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2) + 1)^2 M^2

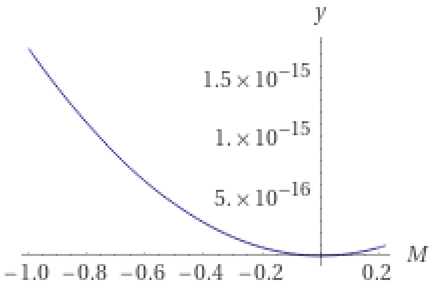
Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

Result:

0

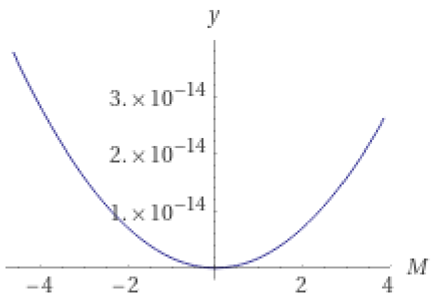
Plots: **(possible mathematical connection with an open string)**



(M from −1 to 0.2)

M = -0.5; M = 0.2

(possible mathematical connection with an open string)



(M from −4.6 to 3.9)

M = 2 ; M = 3

Root:

$M = 0$

Property as a function:

Parity

even

Series expansion at M = 0:

$O(M^{62194})$

(Taylor series)

Series expansion at M = ∞:

$1.75541 \times 10^{-15} M^2 + O\left(\left(\frac{1}{M}\right)^{62194}\right)$

(Taylor series)

Definite integral after subtraction of diverging parts:

$$\int_0^\infty \left(\frac{1}{3} M^2 \left(1 + \frac{18.4084 \left(-0.054323 M^2 + 6.58545 \times 10^{-10} \sqrt{M^4}\right)}{M^2}\right)^2 - 1.75541 \times 10^{-15} M^2\right) dM = 0$$

For M = - 0.5 , we obtain:

$$\frac{1}{3} \left(0.0814845 \times \frac{225.913 \left(-0.054323 M^2 + 6.58545 \times 10^{-10} \sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 (-0.5)^2 + 6.58545×10^-10 sqrt((-0.5)^4)))/(-0.5)^2) + 1)^2 * (-0.5^2)

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,(-0.5)^2+6.58545\times10^{-10}\sqrt{(-0.5)^4}\right)}{(-0.5)^2}+1\right)^2\left(-0.5^2\right)$$

Result:

$$-4.38851344947464545348970783378088020833333333333333333333\ldots\times10^{-16}$$

$-4.38851344947*10^{-16}$

For M = 0.2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 0.2^2 + 6.58545×10^-10 sqrt(0.2^4)))/0.2^2) + 1)^2 0.2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times0.2^2+6.58545\times10^{-10}\sqrt{0.2^4}\right)}{0.2^2}+1\right)^2\times0.2^2$$

Result:

$7.0216215191594327255835325340494083333333333333333333333333\ldots\times 10^{-17}$

$7.021621519159*10^{-17}$

For M = 3:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 3^2 + 6.58545×10^-10 sqrt(3^4)))/3^2) + 1)^2 3^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times3^2+6.58545\times10^{-10}\sqrt{3^4}\right)}{3^2}+1\right)^2\times3^2$$

Result:

$1.579864841810872363256294820161116875\times 10^{-14}$

$1.57986484181*10^{-14}$

For M = 2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 2^2 + 6.58545×10^-10 sqrt(2^4)))/2^2) + 1)^2 2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times2^2+6.58545\times10^{-10}\sqrt{2^4}\right)}{2^2}+1\right)^2\times2^2$$

Result:

$7.02162151915943272558353253404940833333333333333333333333333\ldots\times 10^{-15}$

$7.021621519*10^{-15}$

From the four results

7.021621519*10^-15 ; 1.57986484181*10^-14 ; 7.021621519159*10^-17 ;

-4.38851344947*10^-16

we obtain, after some calculations:

sqrt[1/(2Pi)(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 -4.38851344947*10^-16)]

Input interpretation:

$$\sqrt{\frac{1}{2\pi}\left(7.021621519\times 10^{-15}+1.57986484181\times 10^{-14}+7.021621519\times 10^{-17}-4.38851344947\times 10^{-16}\right)}$$

Result:

$5.9776991059\ldots\times 10^{-8}$

$5.9776991059*10^{-8}$ result very near to the Planck's electric flow 5.975498×10^{-8} that is equal to the following formula:

$$\phi_{\mathbf{P}}^{E}=\mathbf{E}_{\mathbf{P}}\,l_{\mathbf{P}}^{2}=\phi_{\mathbf{P}}\,l_{\mathbf{P}}=\sqrt{\frac{\hbar c}{\varepsilon_0}}$$

We note that:

1/55*(([(((1/[(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 -4.38851344947*10^-16)])))^1/7]-((log^(5/8)(2))/(2 2^(1/8) 3^(1/4) e log^(3/2)(3)))))

Input interpretation:

$$\frac{1}{55}\left(\left(1/\left(7.021621519\times 10^{-15}+1.57986484181\times 10^{-14}+7.021621519\times 10^{-17}-4.38851344947\times 10^{-16}\right)\right)\wedge(1/7)-\frac{\log^{5/8}(2)}{2\sqrt[8]{2}\sqrt[4]{3}\,e\log^{3/2}(3)}\right)$$

$\log(x)$ is the natural logarithm

Result:

1.6181818182…

1.6181818182… result that is a very good approximation to the value of the golden ratio 1.618033988749...

From the Planck units:

Planck Length

$$l_P = \sqrt{\frac{4\pi\hbar G}{c^3}}$$

5.729475 * 10^{-35} Lorentz-Heaviside value

Planck's Electric field strength

$$\mathbf{E}_P = \frac{F_P}{q_P} = \sqrt{\frac{c^7}{16\pi^2\varepsilon_0\hbar G^2}}$$

1.820306 * 10^{61} V*m Lorentz-Heaviside value

Planck's Electric flux

$$\phi_P^E = \mathbf{E}_P l_P^2 = \phi_P l_P = \sqrt{\frac{\hbar c}{\varepsilon_0}}$$

5.975498*10^{-8} V*m Lorentz-Heaviside value

Planck’s Electric potential

$$\phi_P = V_P = \frac{E_P}{q_P} = \sqrt{\frac{c^4}{4\pi\varepsilon_0 G}}$$

$1.042940*10^{27}$ V Lorentz-Heaviside value

Relationship between Planck’s Electric Flux and Planck’s Electric Potential

$E_P * l_P$ $= (1.820306 * 10^{61}) * 5.729475 * 10^{-35}$

Input interpretation:

$$\frac{(1.820306\times 10^{61})\times 5.729475}{10^{35}}$$

Result:

1042939771935000000000000000

Scientific notation:

$1.042939771935\times 10^{27}$

$1.042939771935*10^{27} \approx 1.042940*10^{27}$

Or:

$E_P * l_P^2 / l_P$ $= (5.975498*10^{-8})*1/(5.729475 * 10^{-35})$

Input interpretation:

$$5.975498\times 10^{-8}\times \frac{1}{\frac{5.729475}{10^{35}}}$$

Result:

$1.04293988541707573556041347592929544155441816222254220500133\ldots\times 10^{27}$

$1.042939885417*10^{27} \approx 1.042940*10^{27}$

Observations

We note that, from the number 8, we obtain as follows:

8^2

64

$8^2 \times 2 \times 8$

1024

$8^4 = 8^2 \times 2^6$

True

$8^4 = 4096$

$8^2 \times 2^6 = 4096$

$2^{13} = 2 \times 8^4$

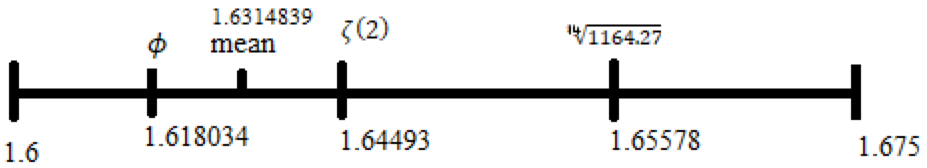
True

$2^{13} = 8192$

$2 \times 8^4 = 8192$

We notice how from the numbers 8 and 2 we get 64, 1024, 4096 and 8192, and that 8 is the fundamental number. In fact $8^2 = 64$, $8^3 = 512$, $8^4 = 4096$. We define it "fundamental number", since 8 is a Fibonacci number, which by rule, divided by the previous one, which is 5, gives 1.6 , a value that tends to the golden ratio, as for all numbers in the Fibonacci sequence

“Golden” Range



Finally we note how $8^2 = 64$, multiplied by 27, to which we add 1, is equal to 1729, the so-called "Hardy-Ramanujan number". Then taking the 15th root of 1729, we obtain a value close to $\zeta(2)$ that 1.6438 ..., which, in turn, is included in the range of what we call "golden numbers"

Furthermore for all the results very near to 1728 or 1729, adding $64 = 8^2$, one obtain values about equal to 1792 or 1793. These are values almost equal to the Planck multipole spectrum frequency 1792.35 and to the hypothetical Gluino mass

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